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University of California History Series

Harmer E. Davis

FOUNDER OF THE INSTITUTE OF TRANSPORTATION AND TRAFFIC ENGINEERING

With an Introduction by
Karl S. Pister

Including an Interview with
Richard M. Zettel

Interviews Conducted by
Wolfgang S. Homburger
in 1992, 1993, and 1997

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Since 1954 the Regional Oral History Office has been interviewing leading participants in or well-placed witnesses to major events in the development of Northern California, the West, and the Nation. Oral history is a method of collecting historical information through tape-recorded interviews between a narrator with firsthand knowledge of historically significant events and a well-informed interviewer, with the goal of preserving substantive additions to the historical record. The tape recording is transcribed, lightly edited for continuity and clarity, and reviewed by the interviewee. The corrected manuscript is indexed, bound with photographs and illustrative materials, and placed in The Bancroft Library at the University of California, Berkeley, and in other research collections for scholarly use. Because it is primary material, oral history is not intended to present the final, verified, or complete narrative of events. It is a spoken account, offered by the interviewee in response to questioning, and as such it is reflective, partisan, deeply involved, and irreplaceable.

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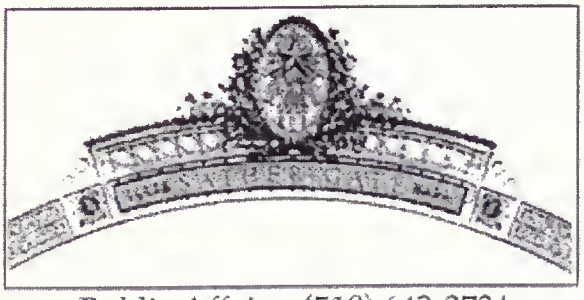
Introduction by Karl S. Pister, Professor of Engineering, Emeritus, UC Berkeley.

Interviewed 1992, 1993, and 1997 by Wolfgang S. Homburger, Research Engineer and Lecturer, Emeritus, UC Berkeley.

UNIVERSITY OF CALIFORNIA, BERKELEY



Public Affairs, (510) 642-3734

NEWS RELEASE, 12/29/98

Founder of UC's Institute of Transportation Studies, Harmer E. Davis, has died at the age of 93

By Robert Sanders, Public Affairs

BERKELEY -- Harmer E. Davis, professor emeritus of civil engineering at the University of California, Berkeley, and founder of what is now the University of California Institute of Transportation Studies, died Dec. 24 at John Muir Medical Center in Walnut Creek, Calif. He was 93.

Davis was an international leader in transportation policy and the founder of the nation's first program combining research and teaching in transportation issues. The model established by Davis in 1947, which includes a close collaboration with the State of California's highway department, has since been followed by many states.

The California legislature asked the University of California to set up an Institute of Transportation and Traffic Engineering to help train the engineers who would be needed as the state upgraded its roads and airports after World War II. Davis, then an associate professor of civil engineering, was picked to help organize the institute.

Davis toured the United States looking at what few programs existed at universities and in state and federal highway departments, then combined these ideas into a pioneering center located on the UC Berkeley campus.

In 1948 he was asked to become its statewide director, and he served in that capacity until his retirement in 1973. During his tenure, institute members conducted significant research on airport runway design and lighting that has had a major impact on how airports are designed and operated today. Other members looked at highway design and traffic control, among other things.

"At the time of his retirement, the national and international stature of Harmer Davis was probably unequaled in the world in the field of transportation," said Vice Chancellor for Research Joseph Cerny at the 1996 dedication ceremony for the Harmer E. Davis Transportation Library in the institute.

The institute has always maintained close ties with the state highway department, now called Caltrans, and in the early years trained many engineers who went on to work for the state. Affiliated transportation centers soon opened at UC Irvine and UC Davis, eventually becoming independent institutes in the 1970s.

As director, Davis participated in many highway, air and urban transport activities, and served as advisor to various legislative and public affairs groups. He had extensive involvement with transportation developments throughout the country, especially with regard to the planning, financing and development of highways and airports.

A member of the National Academy of Engineering, Davis received many honors during his lifetime. Among these were ten awards and medals from the American Society of Civil Engineers. He also was an honorary member of the American Public Works Association and in 1959 chaired

the executive committee of the Highway Research Board of the National Research Council.

Davis was born and raised in Rochester, New York, (d.o.b. 7/11/05) and subsequently obtained his B.S. (1928) and M.S.(1930) in civil engineering from UC Berkeley. He was immediately hired as an assistant professor of civil engineering, and remained on the faculty for 45 years. He served as chair of the civil engineering department from 1955 until 1959.

His own research involved the engineering properties of concrete, asphalt and soils. During World War II, though, he conducted research on the resistance of materials to the impact of shells.

He was also known as an excellent teacher, with a special talent for dealing with students.

Davis is survived by his third wife, Phyllis Davis, of Walnut Creek, Calif., and three children by his first marriage: Lynn Davis of San Diego, Eugene Davis of Union City and Willard Davis of Berkeley. His survivors include three grandchildren and five great-grandchildren.

Davis requested that his remains be cremated and that the ashes be scattered in the northern Sierra.

Those who wish to donate to student aid in his memory should call the UC Berkeley Department of Civil and Environmental Engineering at (510) 642-3261.

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Harmer E. Davis

Harmer E. Davis, a professor emertius of engineering and founder of the University of California at Berkeley's Institute of Transportation Studies, has died at his Walnut Creek home. He was 93.

Professor Davis, who died December 24, was born in Rochester, N.Y., and earned his bachelor's degree in civil engineering in 1928 and master's degree in 1930 from UC Berkeley.

He was immediately hired as an assistant professor of civil engineering, and remained on the faculty until he retired in 1973.

From 1955 to 1959, he was chairman of the civil engineering department.

During his career, Professor Davis became an expert in transportation engineering. In 1947, he started the nation's first program combining research and teaching of transportation issues. Many graduates of his program worked to upgrade California's roads and airports after World War II.

Satellite institutes were established at UC Irvine and UC Davis. His model for research and teaching, which involved working closely with California's highway department, has been copied by many states.

His own research involved engineering properties of concrete, asphalt and soils. In addition, he took part in significant research on airport runway design and lighting.

He was a member of and was honored by many trade and professional groups.

Professor Davis is survived by his wife, Phyllis Davis, and three children from an earlier marriage: Lynn of San Diego, Eugene of Union City and Willard of Berkeley.

In accordance with his wishes, Professor Davis' remains will be cremated and his ashes scattered in the Sierra Nevada.

ACKNOWLEDGEMENTS

On behalf of future researchers, the Regional Oral History Office wishes to thank Wolfgang S. Homburger for donating his time to carry out this oral history with Professor Harmer E. Davis. For five years, off and on, Wolfgang Homburger, working with Harmer Davis, planned, interviewed, edited, and prepared the final manuscript that follows.

We also wish to gratefully acknowledge the financial support provided through a grant from the California State Automobile Association, San Francisco, and a gift from the University of California Class of 1928 for the completion of this oral history.

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PREFACE

When President Robert Gordon Sproul proposed that the Regents of the University of California establish a Regional Oral History Office, he was eager to have the office document both the University's history and its impact on the state. The Regents established the office in 1954, "to tape record the memoirs of persons who have contributed significantly to the history of California and the West," thus embracing President Sproul's vision and expanding its scope.

Administratively, the new program at Berkeley was placed within the library, but the budget line was direct to the Office of the President. An Academic Senate committee served as executive. In the four decades that have followed, the program has grown in scope and personnel, and the office has taken its place as a division of The Bancroft Library, the University's manuscript and rare books library. The essential purpose of the Regional Oral History Office, however, remains the same: to document the movers and shakers of California and the West, and to give special attention to those who have strong and continuing links to the University of California.

The Regional Oral History Office at Berkeley is the oldest oral history program within the University system, and the University History Series is the Regional Oral History Office's longest established and most diverse series of memoirs. This series documents the institutional history of the University, through memoirs with leading professors and administrators. At the same time, by tracing the contributions of graduates, faculty members, officers, and staff to a broad array of economic, social, and political institutions, it provides a record of the impact of the University on the wider community of state and nation.

The oral history approach captures the flavor of incidents, events, and personalities and provides details that formal records cannot reach. For faculty, staff, and alumni, these memoirs serve as reminders of the work of predecessors and foster a sense of responsibility toward those who will join the University in years to come. Thus, they bind together University participants from many of eras and specialties, reminding them of interests in common. For those who are interviewed, the memoirs present a chance to express perceptions about the University, its role and lasting influences, and to offer their own legacy of memories to the University itself.

The University History Series over the years has enjoyed financial support from a variety of sources. These include alumni groups and individuals, campus departments, administrative units, and special groups as well as grants and private gifts. For instance, the Women's Faculty Club supported a series on the club and its members in order to preserve insights into the role of women on campus. The Alumni Association supported a number of interviews, including those with Ida Sproul, wife of the President, and athletic coaches Clint Evans and Brutus Hamilton.

Their own academic units, often supplemented with contributions from colleagues, have contributed for memoirs with Dean Ewald T. Grether, Business Administration; Professor Garff Wilson, Public Ceremonies; Deans Morrough P. O'Brien and John Whinnery, Engineering; and Dean Milton Stern, UC Extension. The Office of the Berkeley Chancellor has supported oral history memoirs with Chancellors Edward W. Strong and Albert H. Bowker.

To illustrate the University/community connection, many memoirs of important University figures have in turn inspired, enriched, or grown out of broader series documenting a variety of significant California issues. For example, the Water Resources Center-sponsored interviews of Professors Percy H. McGaughey, Sidney T. Harding, and Wilfred Langelier have led to an ongoing series of oral histories on California water issues. The California Wine Industry Series originated with an interview of University enologist William V. Cruess and now has grown to a fifty-nine-interview series of California's premier winemakers. California Democratic Committeewoman Elinor Heller was interviewed in a series on California Women Political Leaders, with support from the National Endowment for the Humanities; her oral history was expanded to include an extensive discussion of her years as a Regent of the University through interviews funded by her family's gift to The Bancroft Library.

To further the documentation of the University's impact on state and nation, Berkeley's Class of 1931, as their class gift on the occasion of their fiftieth anniversary, endowed an oral history series titled "The University of California, Source of Community Leaders." The series reflects President Sproul's vision by recording the contributions of the University's alumni, faculty members and administrators. The first oral history focused on President Sproul himself. Interviews with thirty-four key individuals dealt with his career from student years in the early 1900s through his term as the University's eleventh President, from 1930-

1958.

Gifts such as these allow the Regional Oral History Office to continue to document the life of the University and its link with its community. Through these oral history interviews, the University keeps its own history alive, along with the flavor of irreplaceable personal memories, experiences, and perceptions. A full list of completed memoirs and those in process in the series is included following the index of this volume.

September 1994
Regional Oral History Office
University of California
Berkeley, California

Harriet Nathan, Series Director
University History Series

Willa K. Baum, Division Head
Regional Oral History Office

INTRODUCTION--by Karl S. Pister

I have known Harmer Davis more than half a century, dating from my arrival at Berkeley as a Freshman in Civil Engineering in the Fall of 1942. Of course, no young Freshman would have had the courage at that time to inquire of him as to the veracity of the stories that surrounded this already near-legendary figure in the eyes of the students. The truth of the matter is revealed in this history of Harmer's own words (at least to a degree). I had the pleasure and privilege of taking two civil engineering courses from Professor Davis -- one as an undergraduate and one, after World War II, as a graduate student. I also have his signature, as a member of my committee, on the thesis presented for my MS at Berkeley.

When I returned to Berkeley in 1952 as a new Assistant Professor, Harmer was a senior colleague, later my Department Chairman. Indeed, it was he who called me one summer day in 1957 informing me that President Sproul had not acted favorably on my promotion to tenure. (I am happy to add that he and then-Dean O'Brien successfully contested the decision, or I would not be writing this introduction!)

Looking back on the many years of association with Professor Davis, what are those personal characteristics, along with particular incidents, that stand out in one's memory? I remember Harmer first as a fine classroom teacher. He came to class well prepared and presented his lectures with clarity and enthusiasm. He had a special talent for dealing with students -- often gaining great advantage through his wry sense of humor and his unfathomable store of jokes and stories. In addition, he established a strong presence among students by participating in the affairs of the Student Chapter of the American Society of Civil Engineers. His after-dinner comments at Society events can only be called memorable.

As a colleague in the Department of Civil Engineering, Harmer served as a role model for young faculty by virtue of his sense of balance among teaching, research, and University public service. During his career he was active in the exercise of shared governance, serving both on important committees of the Berkeley Division of the Academic Senate as well as taking on the responsibilities of Department Chairman and Founding Director of the Institute of Transportation and Traffic Engineering. In these assignments he displayed both vision and creativity, as well as the ability to encourage and work harmoniously with his colleagues. At a time when disciplinary specialization was on the ascendancy, Professor Davis was a strong voice reminding faculty colleagues of the importance of maintaining a sufficiently broad perspective in the teaching of the practice of engineering.

Although his contributions to education and to the profession were manifold, in my view his most significant and enduring contribution to the Berkeley Campus and to the University would be found in the role that he assumed in the establishment, and later the operation of the Institute of Transportation and Traffic Engineering. Harmer had very little formal training in the disciplines that were required to make this Institute blossom

as quickly and abundantly as it did. Its success, and his success in making it happen, are a clear consequence of the steep learning curve that his superb intellect and energy could sustain. He was able to assemble an exceptional group of faculty and staff and gain sufficient resources to ensure their productivity in the best tradition of the University to carry out its mission of teaching, research, and public service. Relatively few faculty have the inclination or the talent to make the transition from academic scholar to academic administrator and to do it with success. In his role as Founding Director of the Institute of Transportation and Traffic Engineering Harmer gained the support of Presidents Sproul and Kerr, as well as that of his Dean Morrough P. O'Brien. In addition, he was able to count on the support of key elected State officials. Such consortia are rare indeed in the annals of academe. Nor did his accomplishments escape the attention of his peers across the nation: he was elected to the National Academy of Engineering in one of the earliest classes and his professional record led to international recognition and the transportation field.

My remarks alone cannot possibly do justice to the man whose history follows in this volume. To use Harmer's own words: "...not only you don't have to remember everything, but you can't remember everything..." (speaking of the benefits of old age). I had the good fortune to have shared many of the experiences of which he speaks. Although "I can't remember everything", I cannot forget the impact that this remarkable man had on the institution that he has loved and upon the faculty, staff, and students with whom he worked over the many years of his association with the University. In meeting Civil Engineering alumni during my tenure as Dean of the College of Engineering, invariably I would have to answer the question: "How is old Professor Harmer Davis doing these days?" (In truth, questioners more frequently used his popular nickname in place of his given name, but I will leave that puzzle to the reader.) For those readers who know Professor Davis, this history will bring back many memories. For others, I am confident that the vicarious association with Professor Davis afforded by this oral history will leave them with an understanding of the stature of this accomplished engineering teacher, scholar, and administrator.

Karl S. Pister
Chancellor Emeritus, University of California, Santa Cruz
Roy W. Carlson Professor of Engineering, Emeritus, University of California, Berkeley

Oakland, California
July 1997

INTERVIEW HISTORY

Professor Davis was invited to participate in the Regional Oral History Series in order to record both his personal achievements in civil and transportation engineering education and research, and to document the founding and the early history of the Institute of Transportation and Traffic Engineering (now the Institute of Transportation Studies) at the University of California at Berkeley.

Six interviews were conducted at Professor Davis' home in Walnut Creek between November 1992 and April 1993. A seventh and concluding interview was postponed for various reasons, and was not held until May 1997, at which time Phyllis (Mrs. Harmer) Davis assisted. The transcripts of these interviews comprise the first ten chapters of this document.

To supplement the material on the founding of the Institute, two interviews were conducted in early 1993 with Richard M. Zettel, who was instrumental in advising the legislature on transportation legislation in the mid 1940s, and then joined the Institute as a research economist. These interviews are contained in Chapter XI.

In April 1997, the library of the Institute was named the Harmer E. Davis Transportation Library in honor of Professor Davis. A transcript of the ceremonies held on this occasion, to the extent that a taped record exists, are included in Chapter XII.

Professor Karl S. Pister, Chancellor Emeritus of the University of California at Santa Cruz and Roy W. Carlson Professor of Engineering Emeritus at the University of California Berkeley, provides the valuable introduction that appears immediately ahead of this history.

The Appendix contains several documents that illustrate high points of Professor Davis' career or information related to the early years of the Institute.

Wolfgang S. Homburger, Interviewer
July 1997

Harmer E. Davis BIOGRAPHICAL INFORMATION

Date of Birth: July 11, 1905
Place of Birth: Rochester, NY

Education: Charlotte High School, NY; Huntington Park High School, CA, graduated 1923.
University of California, Berkeley, B.S. in Civil Engineering, 1928; M.S. in Civil Engineering, 1930.

Employment: University of California, Berkeley:
1928-30 Assistant in Civil Engineering
1930-36 Instructor in Civil Engineering
1936-39 Assistant Professor in Civil Engineering
1939-48 Associate Professor of Civil Engineering
1948-73 Professor of Civil Engineering and Director, Institute of Transportation and Traffic Engineering
1955-59 Chairman, Department of Civil Engineering

Affiliations: American Automobile Association--Member, Board of Directors, 1963-66.
American Concrete Institute--Director 1949-51
American Public Works Association--Honorary Member; Board of Trustees of the Research Foundation, 1955-57; Chairman, Long-Range Planning Committee, 1963-64.
American Road Builders Association--Vice President, Western Region, 1953-54; Director, Education Division, 1961-64.
American Society of Civil Engineers--Fellow; Member, Board of Direction, 1959-63; Member or Chairman of numerous committees at the national and section levels.
American Society for Engineering Education--Member
American Society for Testing and Materials--Member
California State Automobile Association--Member, Board of Directors.
California State Chamber of Commerce--Member, Statewide Highway Committee, 1961-late 1960s
Highway [now Transportation] Research Board of the National Research Council--Vice Chairman of Executive Committee, 1957; Chairman, 1959; member or chairman of numerous committees.
International Road Federation--Member of several committees.
Institute of Traffic [now Transportation] Engineers--Affiliate.
National Research Council, Division of Engineering and Industrial Research--Member, Executive Committee, 1961-late 1960s.
Society of American Military Engineers--Member, 1950-60; San Francisco Post: Director, 1950-52.
Society for the History of Technology--Member

Awards:

1959 Roy Crum Award, Highway Research Board, National Research Council

1961 Honorary Member, American Public Works Association

1966 Selected as Sigma Xi National Lecturer

1967 Elected to membership in the National Academy of Engineering

1967 James Laurie Prize, American Society of Civil Engineers

1970 George S. Bartlett Award, jointly by the Highway Research Board, the American Association of State Highway Officials, and the American Road Builders' Association, for outstanding contributions to highway progress.

I EARLY LIFE, 1905-1923

[Interview 1: November 5, 1992]##[1]

Homburger: I would like to suggest that we go back in time as far as you wish, and start out with your early life.

Davis: Thank you, Wolf; I'll start at the beginning. I was born and brought up in Rochester, New York, where I just saw the light of day, but probably didn't recognize it, in 1905. After proceeding through the Rochester grammar schools, I attended the little classical high school in the town of Charlotte [pronounces "ShaLOTT"], a suburb of Rochester.

Homburger: Could you spell that for me?

Davis: [spells] As a personal name, it's called CHARlotte, but apparently the early settlers there liked "Sha-LOTT."

There, in the Charlotte High School, we were expected to take at least three years of Latin, which I did. Also, Greek was optional, and one foreign language--French or German. But the latter was canceled on account of World War I with Germany.

We had English for four years, and indeed, it included grammar and classical literature, writing and speaking. Everyone was expected to take math, algebra, and plane geometry, and for those who wished to go into a technical career, it included also trigonometry in the third year.

Music was optional. I might point out that George Eastman of the Eastman Kodak Company fame was very much interested in education, and he established a fund for music instruction in the Rochester schools. This included not only individual instruction but also the loan of whatever instrument the student chose. And so I chose instruction in clarinet, and got to play in the school orchestra.

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[1] This symbol indicates the start of a new tape or tape segment. For guide on tapes, see page 113.

My dad was in the construction business, mainly on the housing side. In most summers, I earned a little spending money working for my dad.

But then something happened. In 1921 there began, at least in New York State, a severe depression in the construction business. My dad had been to California in his "wanderjahr" and had been greatly taken by it. And also, one of his early friends in the same business had moved to California some years earlier, and kept sending back stories of how great it was and how things there, both in living and doing, were always available.

So in the latter part of 1922, the Davis family migrated to California.

Homburger: Could you tell me just what the family consisted of at that time?

Davis: Ah, yes. My mother and father, and a younger sister and a younger brother, so there were three of us.

Homburger: How much younger were your siblings?

Davis: My sister was three years younger than I, and my brother was five years younger than I.

The interesting side of migrating to California: on the run from Chicago to Los Angeles on the Santa Fe Railway, what with stopping to eat at strategic points along the way, were the Harvey houses. We finally settled in Huntington Park. I entered Huntington Park High in the fall of 1922. They forgave me for the month or so that I had missed in my junior year at Charlotte, and I was able to finish high school in June of 1923.

In New York State, I had hoped to go to Cornell and study engineering, possibly because of a growing interest in building things. In New York State, the general educational program is run by the Regents of the State of New York, and they set all the examinations. It so happened that I guess I did well enough in these Regents' examinations throughout high school there until I left that I was eligible for a substantial scholarship to go to Cornell. However, things changed.

II COLLEGE YEARS, 1923-1928

Davis: So I entered Cal in the fall of 1923. According to my dad, the architects were the influential people in the building design field, at least in the housing sector, and so I enrolled in the school of architecture at Berkeley.

Now, at Cal, all entering freshmen were required to enroll in ROTC. Since I could play clarinet, I was assigned to the ROTC band, although we also were instructed in various drills, including handling of firearms. I also played in the ASUC band throughout college.

It turned out to be an exciting year, however. The Berkeley fire took place early that fall. On that day, the winds continued, and the fire began eating its way into north Berkeley. There was a possibility that it would reach the campus. The ROTC was called out, in uniform, for duty. The school of architecture was located at that time in a wonderful little redwood structure covered with dry shingles, roof and siding, on Hearst Avenue opposite Euclid Avenue, down which the fire was beginning to march.

Our job was to take out of the architecture library, which had many priceless volumes, the books and files, and deposit them in a currently constructed concrete building, now the engineering hydraulics lab, which was not too far away. We did that.

By late morning, residents of north Berkeley were trying to carry down toward campus what they thought they could save someplace out of reach of the fire. And some of them carried suitcases or big bags, some carried cats, and a few others carried canaries in cages.

At that point, the lads in a fraternity, the name of which I forget now, located on Le Conte Avenue, decided to save their grand piano. They got it out of the house and moved it on its castors along Le Conte Avenue on the pavement, and they started down Euclid Avenue.

Now, at Ridge Road on Euclid Avenue, the road suddenly changes from smooth asphalt to brick. And at Ridge Road, the piano began to levitate because of the increase in grade.

Suddenly the legs of the piano dropped off, and the marvelous old piano slid downhill on its belly for 100 yards or so before coming to rest.

Homburger: This was one of your first research projects in pavement surfaces?

Davis: I would attribute my interest in pavement roughness to that little incident.

At about noon, we were ordered to enter each of the houses up Euclid Avenue and on the side streets to determine whether anyone was left there, unable to get out.

At one point, a house, which we were checking on, seemed perfectly empty but there was a great lunch all set out on the kitchen table. Not having had much to eat earlier that day, my partner and I sat down for a quick bite. At that point, a Berkeley police officer, also on the dwelling clearance patrol, poked his head in and with suitable shouted expletives, ordered us to "Get outa that there righta soon! Right soon now!" His added gems I should not repeat here.

But he did say, "Why don't you dumb blankety-blanks see that the house next door is already beginning to burn?" We did look out, and we saw out the kitchen window that the flames were beginning to eat on the window frames of that house next door.

That night, we were ordered to do guard duty on the western part of the campus where many people had deposited their belongings, and had hoped for the best. Looters had already begun making their way into Berkeley. We were to safeguard defenseless people and their belongings. We were issued rifles, but no ammunition. Anyway, we got through the night without any untoward event.

The next thing that happened was that I began to think about what I was supposed to be studying in the school of architecture. But at that time, the architectural school was deeply involved in carrying out the Beaux Arts tradition. So, in preparation for that, I was expected to learn things that I had no background for, such as pencil drawing, particularly with soft pencils, pen-and-ink, and elements of architectural rendering.

There were some other courses, such as elementary math and so on. But I began wondering how on earth would I ever learn to design or construct such mundane things as dams, tunnels, bridges, and the like.

At the end of the semester, I petitioned for transfer to Engineering, especially Civil Engineering. I was granted the transfer, but immediately I found I was lacking in some of the beginning technical courses. This meant I had to wait until the following fall to study such things as surveying.

However, I accepted the fact it would take me five years for a bachelor's degree, and I proceeded to enjoy myself with some of the great offerings on the Berkeley campus--in economics, in philosophy, in language. I took courses in German, hoping that if I got into the research field by some peculiar fluke, I would be able to transfer some of the contributions of the German scientists and engineers.

Homburger: When you got to Berkeley, where did you live? Were you in a fraternity, or were there dormitories in those days?

Davis: No, they had no dormitories in those days, but there were numerous kinds of rooming houses and boarding houses. I arrived from Los Angeles on the old Valley Train, on the SP, and I didn't know that it came up the valley and over, and then south toward Berkeley and Oakland and San Francisco and so on.

So I got off the train and started marching toward the Bay. But I soon found that I was going in the wrong direction, and made my way up University Avenue, got off, and began to learn from a little office they had about where one could find a rooming house, which I did.

I found a very nice clean place called the White House, of all things. It was a large, old, early dwelling on a street that was parallel to Telegraph just outside of Sather Gate.

I went in, was assigned a room, put down my bags, and walked downstairs. And there, in this big living room, were a bunch of young men with their backs to the fireplace. I soon learned that in Berkeley in those days, most house heating was done by wood in fireplaces. These chaps, on a rather chilly foggy day in August, were warming their backsides, not just standing there out of courtesy for a frosh who had just landed in town.

But at any rate, one of these young chaps, turned out to be a sophomore, and the only thing he ever read was the funny papers. He sidled over to me and said, "What's your name,

Frosh?" I said, "Davis." "Oh," he said, "Stinky Davis!" Well, it so happens that one of the characters in the funny papers in those years and earlier was a Stinky Davis.

Another character who was in front of the fireplace there was Carl Vogt--

Homburger: Can you spell that?

Davis: [spells] --who later became a colleague, as he became professor of mechanical engineering and specialized on the heat power side.

But at any rate, he thought that was the funniest thing he ever heard, and he never let it die. So naturally then, the students thought it was funny, too. And later, I was much amused that when the senior class was about to graduate--in Civil Engineering, anyway--and they threw their final dinner, and when one or the other or some began to get a little bit on the tipsy side, as young men are wont to do--at least in those days they did--one or more separately would sidle up to me and say, "Say, Prof, you know what they call you?" And I would say, "Why, no. What?" And so they would recite this name. [laughs]

Homburger: So you entered in 1923, and after one year you spent four more years in Civil Engineering, so you graduated in 1928.

Davis: Yes.

As a member of the ASUC band, we had to entertain at many things besides football. We got to go to many different sports. I was always active, either studying or being in class or playing in the band, or the ROTC band. And also I found that the university had a great gymnasium, and a friend of mine and I used to enjoy swimming.

By the way, in those days, all freshmen were required to pass certain physical examinations. One of them had to do with swimming; everybody had to know how to swim. The other related to physical fitness. One was agility; you had to climb a rope in order to pass. One was self-defense: either in boxing, wrestling, or fencing. I took up some boxing and also later got more interested in fencing, as I had some French friends, so I thoroughly enjoyed my physical education experience.

At any rate, I entered the College of Civil Engineering. At that time, there were three colleges on campus that related to engineering. One was civil, and that's the old brick

building which faces on the esplanade by the Campanile. It's now been several other departments since then.

The second was the College of Mechanics, which included mechanical engineering, meaning machinery, heat power, driven kinds of things, and that was the energy side of it, and also there was electrical engineering, which was the electric power side. And the third college was the College of Mining. They turned out some great miners in those days.

But, in later years, as the colleges all grew larger and as the number of divisions or departments within those colleges grew larger, I think there was a greater recognition of the interrelation and interchange of ideas that should take place between the various fields of engineering, there was a move toward a college of engineering.

One of the big moves that was made was that [Donald H.] McLaughlin, who was then head of the College of Mining, and which was one of the most reluctant to have been joined up with the other engineering departments, was made dean and brought the three colleges together. The reason for the name of the headquarters of the engineering building, McLaughlin Hall, was due to the great service of McLaughlin.

Subsequently, Dean Morrough P. O'Brien became dean. By that time, of course, engineering was facing many new kinds of problems. The pure necessity of better preparation in the analytical field, all the branches of mathematics and so on, and new kinds of analysis. And also, in order to meet the great new influxes of students who were attempting to become engineers, some of the set-up of the old line departments of the new College of Engineering was being strained. It required new set-ups for overall administration, new set-ups for the departments.

I attribute to O'Brien the foresight to bring the engineering departments of Berkeley into the modern world, by his leadership and by his vision of what would be required in the future.

Homburger: You actually joined the college as a student in 1924. Who were some of the faculty members, and who was the dean that taught you?

Davis: The dean of the College of Civil Engineering, even over in the old building--he had been long before because he had come to Berkeley in the early part of the century, and he was a graduate of some of the big Eastern universities--was Charles

Derleth, Jr. He was a very intellectual type and very practical at the same time. He was also a hard taskmaster.

At that time, he began to see--and finally agreed, possibly--that research development was important to civil engineering as well as in some of the other kinds of engineering which had begun research much earlier. And so he established a materials testing laboratory.

He persuaded a young man by the name of Clement T. Wiscosil, who had graduated from Wisconsin. Now, Wisconsin, being in a lumber country, or at least an early lumber country, had a great school in engineering, which embarked on a great program of research in wood. But of course, one can easily expand to other materials if one knows the problems of research in materials. And he persuaded Wiscosil to come to Berkeley and set up a materials research lab. Wiscosil carried that on for a number of years.

Wiscosil, however, fell into differences with Dean Derleth about the conduct of the lab, and I think some degree of unwillingness to broaden it out to the field where he was not familiar, which is to say concrete, which was coming into big vogue and usage in the United States, and of course steel and other metals.

And so in the early twenties, Raymond E. Davis was brought and made the head of the laboratory effort in Civil Engineering. Davis was a man with a broad view of what was developing in the field, and began to concentrate on concrete as a major area for research, although wood and steel and aluminum and even some marginal materials--asphalts--had some attention.

I entered in '23, that was a couple of years after Raymond Davis arrived, and took the undergraduate lab work, and also it so happened that the increase in research that was going and which was funded by government agencies and also outside grants began to get large enough to require people who gave quite a bit of attention to the laboratory. And I was employed as a research assistant at that time, and also took my master's thesis in the field of concrete.

Those were great days, because in that period, there was a big interest in developing water supply in California. There were a number of arch concrete dams, which were a relatively new type of dam, and required not only a special kind of analysis but also careful control of the concrete.

And then a little later, there were some of the very large dams, such as Hoover Dam or Boulder Dam, and also some of the dams on the Columbia River. Some of the problems with respect to a very large dam, like a Boulder Dam, were that cement is a chemical which when it reacts with water, liberates heat. In a large mass, the heat will not move very quickly to the outside and be dissipated. And if the inside gets warmer than the outside, then cracks form. And cracks are dynamite for dams, because water begins to seep through, it destroys the whole dam and great floods take place.

So, one of the problems was to develop a low-heat cement. And through his knowledge of people in the cement industry, there was donated to that lab and the university a rather small kiln for making cement. That was set up in the outdoor central enclosure in the materials laboratory that now stands there in Berkeley near the engineering building.

He also found a young man who was interested in cement chemistry. Between them, there was developed a low-heat cement for use in Boulder Dam, which was one of the reasons why Boulder Dam has been a good solid structure.

Homburger: Do you happen to remember the name of that other young man?

Davis: No, I'd have to look it up.

Homburger: It's not too important. So, in civil engineering then, the field of materials was a very important one. Was the structural field as important as it has become now?

Davis: Oh, yes. There were many new developments in the structural area. As I moved along and became more and more immersed in the problems of behavior of materials, new materials, and their control, of course others were doing advanced work in structures. We were all expected to be able to teach some structures; we all had structural engineering courses.

As a matter of fact, as a young sidelight, when I finally transferred into Civil Engineering and I began inquiring about things to major, and naturally I was interested in structures, somehow I was told that, "Well, some of the best introductory structural courses are given by Bernard Etcheverry." Etcheverry was head of the Irrigation Engineering group in Civil Engineering. So there's an anomaly: an eminent hydraulic engineer and irrigation engineer who gave the best course in structures. Now, this had to do with his fine teaching, I think.

Derleth was a structural man. As a matter of fact, he was chief on the consulting board of both the Bay Bridge and Golden Gate Bridge, and he was chief engineer of the Carquinez Bridge. So we learned a lot about that.

I think it might be worthwhile to pause a few minutes and say some things about Derleth. He had his own style of teaching and lecturing, and he expected a great deal of his students, mainly through problems. But he was a learned man, and he would insert into his lectures things he would call diversions. He would divert every now and then and quote something from the classics.

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Davis: Anybody who would listen and follow out his problems that he gave, and listen to even his criticism as he criticized some of the problems that you may have not done very well, learned a great deal.

Now, associated with structures is also the foundations. Much of the early foundation work in structural engineering was by the accumulation of experience. There was relatively little theory that pertained. One of the great reasons for the early societies of the various parts of engineering which developed was to be able to pass on the experience of people who had been successful--oh, I might say, even pass on some of the problems in which there were disasters and why they occurred.

All as part of the learning process, we were expected to avidly read the journals of the American Society of Civil Engineers, at least in the area where I was. I think the same thing happened in mechanical, electrical, and mining.

But at any rate, the foundations side of it was one of the latest to be able to develop a good theoretical base. In some areas, there's also been bad theoretical bases. And about the time I became a young instructor, there was work done at Harvard and MIT in what came to be called soil mechanics, the mechanics of the behavior of soil masses. The men who developed that became well known for their knowledge and appreciation of the application of that field, while at the same time they were developing really good theory.

Being in the materials laboratory, I became quite enamored of the soil mechanics development, and Derleth, recognizing that that approach to the foundation problems would become an essential part of that phase of structural engineering, asked me to give the soil mechanics lectures in his foundation

courses. So that was my first introduction to something beyond concrete and steel and wood.

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III EARLY DAYS ON THE FACULTY, 1930-1947

Homburger: Was this while you were still a graduate student, or had you finished your master's degree?

Davis: No, it was when I had become an instructor.

Derleth also had some ideas which probably aren't viewed with great favor. But his theory was that all young men who wished to be good engineers should get out into practice just as soon as they could possibly do so, naturally because in many areas, there wasn't enough theory to do much more. The direct concern with the behavior of structures of any kind was highly important for a young man to assimilate as soon as possible. For that reason, Derleth rather looked down on graduate work, and he held that view even while I took the master's degree.

In 1930, there occurred a vacancy in Civil Engineering, and Raymond Davis proposed me. Derleth had first thought not very much of that. He thought I should get out. I had done quite well as an undergraduate, but I needed to learn something in the field. However, R.E. was persuasive, and I became an instructor in 1930.

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When the Bay Bridge was under design, there was the question of the behavior of the foundations under the Bay, under the great layers of mud and so on. Derleth was on the consulting committee for that bridge. One of the great foundation engineers who had early looked into what soil mechanics could do was the consultant on the foundations. He wanted to have some consolidation tests of various layers of the earth--bay mud, and then somewhat compressed strata and so on--and there were no laboratories in the West that could handle that. So he approached R.E. and asked if we could do that. R.E. asked me to learn something about this and to see if I could make these tests for them, which was done.

Not only did I then become more interested in soil mechanics, but also Derleth began to recognize that this was

something that contributed something to the safety of building foundations. So that was how he, I guess, came around and decided that he had to insert that into his foundation courses, and where I was asked to lecture in that area.

If one thinks then of granular materials--after all, concrete is made from granular materials--and soil, granular materials from the beginning, if you have a Portland cement as the binder for concrete, what about looking at other binders? Well, that brought in asphalt.

So by that time, I was more or less in charge of the granular material activity in that laboratory--R.E. Davis was the director of the lab for a number of years there--so I also introduced the testing and learning about asphaltic mixes. So we expanded the granular materials side. And that is how a number of your colleagues who have been in the transportation side, such as [Prof. Carl L.] Monismith, got interested in the asphalt side of it, and as you know, Monismith has made great contributions in that area.

But at any rate, back to Derleth, who was the dean for a very long time and who had a great influence in the formation and the gradual changes in the nature of the way engineering was taught and researched at Berkeley.

So anyway, we got as far as O'Brien here I think in the succession of deans.

Homburger: O'Brien followed Derleth? Is that right?

Davis: No, O'Brien followed McLaughlin. McLaughlin brought it together.

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One of the amazing things that happened as regards the nature of the organization of the College of Engineering under O'Brien, was first his effort to do something about the administration of the various departments. By that time I was already associated with the Institute [of Transportation and Traffic Engineering] when O'Brien began working on this aspect of it. So he also urged me to take on the chairmanship of the Department of Civil Engineering.

Before that time, we had divisions of the department. There was not only structural engineering, but there was sanitary engineering, and there was water supply engineering, and that kind of thing. Very often these people didn't even talk to each other. In effect, they were separate departments.

Under O'Brien's urging, I think it was, he brought those various divisions of the overall Department of Engineering, which O'Brien established in order to make a change in the administration, he brought into being a department which included these three separate divisions which had had a loose connection--some of them--with Civil Engineering.

So there was the problem of how to have a strong Civil Engineering Department and still have enough interchange among all of the members of the Civil Engineering Department, no matter what subgroup they belonged to. This was a kind of a difficult thing to bring about. You don't just go out and say, "Look, you guys, you've got to knock your heads together and you've got to speak to each other and you've got to work for the department, or for the good of the department, anyway."

Another thing that happened about that time, and which was fostered by O'Brien--

Homburger: Roughly what year are we in now?

Davis: We're back in the early fifties. I think I became chairman in about '53 or '54, I'd have to check that too.

O'Brien was encouraging graduate work, so that engineers would have more--if they had the interest and the ability--than just four years of undergraduate work. Obviously, in these various sectors, a man would have to know about enough of his particular field, whether it be water or solids or frames or what, in order to teach graduate students. A backup of teaching graduate work is research. And the problem of graduate students and research is to be able to attract students who are able, who have the insight and the brains and so on to advance in this field new to them.

So there was the question then--which began to, I think, become clear to all members in engineering--that it was important to try to do those things to be able to attract able graduate students. That gave me an idea, and that was that if we had divisions of civil engineering, under a sort of general policy of favoring graduate research and graduate instruction, but working within the various rules of the university as carried out by the Civil Engineering Department, that we could get each of these specialties interested in having enough latitude to be able to develop programs which would be of interest and develop a strong graduate school. So that was what we began to accomplish along the mid-fifties.

Homburger: Could we be personal for a moment. Could you tell me what happened to your family after your moving to Berkeley?

Davis: My father and mother stayed in their homes in Huntington Park. After he retired, they lived a number of years. They were both very long-lived, and lived well into their eighties.

My sister was with a store as an employee and later as one of the more important people in it, which handled art goods and this kind of thing, and she'd always been interested in that area. And then later, she married. Her husband has now passed away; she's still alive.

Homburger: In Southern California?

Davis: In Southern California.

My brother, Wallace, who followed me by five years, came to Berkeley and graduated in civil engineering, and for a while he worked with a big construction firm. Then when the war came along, he was with the Corps of Engineers and saw service both in the Far East and also in Europe.

When that was over, he came back and worked for the Corps of Engineers in California, and did some work for the Division of Highways. But he developed a heart problem, and suffered a stroke and passed away, a good many years ago now.

Homburger: What was your sister's first name?

Davis: My sister? Bernice.

Homburger: I'm also interested to go back to your career: starting in 1930 you were an instructor, and then you became an assistant professor a few years after that. Is that right?

Davis: Yes. It was 1936 before I became assistant professor because we were in the dregs of the Depression in the early thirties, and nobody was getting promoted.

Homburger: It was a financial crisis then just as there is now?

Davis: Yes. And then I became assistant professor, and then they made up for it by making me associate professor in '39.

Homburger: What was it like at Berkeley during the war?

Davis: Busier than hell.

Homburger: Tell me about it.

Davis: Well, not only was the problem of education important, to develop technical people and get them out, but also to train

people like draftsmen and inspectors and so on. In engineering, we had a very large extension program--War Extension, it was called. We gave courses all up and down California.

One of the types of courses in which I was asked to [teach], because there was no one available for that particular assignment at the time, was a class mostly of women who were being trained for design draftsmen in the aircraft industry.

But outside of the regular instructional duties of students over in college, I was very busy on various kinds of war research. One of the early ones had to do with the development of criteria for the protection of the locks on the Panama Canal. At that time, aerial warfare had developed to where planes could drop 2,000-pound bombs of high explosives. Just after Pearl Harbor, although perhaps the U.S. military had a sense that it might happen earlier, there was an urgency to find out what can be done to provide protection for the locks.

It seems that the only battery of big guns in the United States was over at Fort Cronkite on the Marin coast, and the only battery of big guns which would swing around far enough to shoot at a land target. They could shoot twelve miles out to sea and so on, but none of the others could swing around far enough. And so from Washington the Corps of Engineers out here was directed to conduct some tests.

The science of how projectiles behave after they strike something was kind of limited, at least on a large scale. That's called exterior ballistics. And the job then was to really develop the bases for exterior ballistics on a scale of very large projectiles and with large masses. So over there at Cronkite, they asked R.E. for help, and I was asked to serve as the field engineer for this. I took out a leave from the university and got temporary appointment in the Corps of Engineers.

What we did was design and build a number of large concrete blocks in front of a cliff where this gun could come around and shoot at them. We had everything from about twelve feet, eighteen feet, twenty-four feet thick. Some of them had reinforcing, and some were not reinforced. So there were quite a few of these blocks in this big stretch.

The great day came, we had our blocks built, and we had an expert on measuring velocities of projectiles which consisted of two screens at a known distance apart just in front of where the projectile would impact, and the kind of instruments that

would pick up the contact with the screen by the projectile and so on, so they could determine the impact velocity.

Now, when a bomb drops, of course, it finally comes to a constant velocity because of the resistance of the air around it. That had been determined insofar as bomb-type projectiles.

We finally got ready for this, and the concrete had hardened the right number of days, and we were getting all lined up. The battery was staffed, and the instruments were all in place, all ready to go and measure all this stuff. So we started out with one of the intermediate size blocks.

I was behind a big steel plate so I could keep track of everything that was going on here, so I finally gave the word to fire. We had asked for a given terminal velocity, which meant reducing the charge.

The commander of the battery was a young fellow who had just come in from the reserves, and he had his orders that you had to have a full charge, so he set a full charge. [laughs] And this darn projectile--these were big projectiles--went right through about twenty feet of concrete and three feet into the rock wall beyond it. [laughing] Which didn't tell us anything, except that it went through.

So we said, "Well, we've just got to have the impact velocity of these bombs." He said, "Well, I can't do it." So I got ahold of the office of the Corps of Engineers in San Francisco, and they got ahold of Washington, and pretty soon he had a different order. "Give them what they want."

He wasn't very happy about that, but anyway, we set up again. The gun was aimed, the back of the projectile of course in the chamber was loaded and so on. Everybody was ready with all the measuring instruments, and I gave the order to fire, and nothing happened. And nothing happened. And nothing happened.

So I and a couple of other guys went up to see what was wrong. At that point, since the thing hadn't fired, some one of the gunners or somebody decided they'd have to see what was wrong in there. So he opens the breech, and there was a little rim of fire on the edge of one of the sacks that they put in there. Apparently, they'd thrown those sacks in carelessly, and they had fallen, so that it didn't catch. It just hit the edge of one of the sacks.

Boy, did they close that breech in a hurry! [laughs] If this, of course, had exploded with that breech open, why, the whole inside of that battery would have been gone.

Anyway, they fixed that up, and from then on we went very happily and used a few different impact velocities and all the different kinds of concrete and reinforcing and depths and so on.

Although there was a rather interesting thing which wasn't quite a catastrophe but did happen. Naturally, when a bomb lands and it has explosive, it will explode, so that you don't get a fine hole that's drilled by this spinning thing. And so we jacked a projectile into one of these holes. I think we put it in there about six or eight feet, pushed it in, and attached a detonator to it, and set it off.

Well, it blew. It blew a wide gap in this big concrete block, and sent chunks of concrete to hell and gone over the far ridge. It began to fall on a temporary military training camp that was on the far ridge, and these guys thought that the Japs had really landed, and boy, they were screwing all over the place. [laughing] So those little things happen.

Homburger: How long was your assignment with the Corps of Engineers?

Davis: Oh, I think it was two or three months, because I had to write a report also.

In putting together the data and reducing the data and plotting up the various relationships, such as impact speed versus strength of concrete and versus depth of penetration and things like that, and in addition, in order to get a variation on this, the Corps of Engineers also had an appropriate section of the army make some other penetration tests using machine guns, which would be of moderate caliber, and a three-inch field gun. Also in the laboratory I had an old .45 70-40 or whatever you call it, an early Civil War rifle, and so we took it down to the basement of the laboratory and had some steel projectiles made, got some shells that we could put in this gun, and locked the latch down on the breech of the gun so it wouldn't backfire, and we shot quite a few rounds of forty-caliber stuff into concrete stuff we made in the laboratory.

This gave us quite a large range over different caliber. So plotting caliber, impact velocity, and strength of material, got some pretty smooth curves there which enabled then the Corps of Engineers to select for whatever they needed--thickness and so on, having penetration as one of the parameters--what they needed to design something for the locks

down there.

Homburger: It must have also been useful for air raid shelters and other such things.

Davis: Yes. And apparently, I couldn't find in the literature whether exterior ballistics had ever been carried that far.

Another interesting war job--these were all hurry-up, you know. Gosh, you'd have to work night and day. I might mention that during the earlier part of the war--you know [Professor] Howard Eberhard, I guess.

Homburger: Yes.

Davis: Well, there was a big question of whether Hamilton Field and other big military airports which had been constructed in earlier years would be able to stand up and keep going under the new heavy bombers that were just coming out. So R.E. asked Howard to be the field engineer on that and run the tests over there at Hamilton Field, which he did, and they learned a heck of a lot. What they found out did the job.

But they had to work in the dark. They had strain gauges buried in the concrete here and there, and other electrical instruments to read the deflection as well as to try to get the strains down in the concrete, and Howard, you know, is a great big six-foot-something tall, early basketball player.

One night over there while they were working, one of his assistants who was reading the strain gauge had trouble with it. So Howard kneels down to help this kid with his strain gauge measurement, and his big, long foot was sticking out partly into the runway. And suddenly, a great big heavy truck, which was coming along with no lights--all he could see was some light on ahead to get there--and which was one of the test vehicles--ran over Howard's leg.

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And some young surgeon, who I guess was nervous or something, left the tourniquet on his leg. Obviously, that's a good way to start gangrene.

Meanwhile, they'd got ahold of us by phone, and we phoned the UC hospital in San Francisco. Fortunately, they had a very excellent surgeon over there who was familiar with bone breaks and other kinds of things. So we had them put him in an ambulance and get him over there right away. This surgeon took

a chance and cut the leg just below the knee, so as to preserve the knee joint.

That worked out all right, except that it meant he had to have a temporary leg. Some of them were pretty crude, those early temporary legs. The leg that he had just hurt him like hell. So he talked to Vern, the surgeon, and told him about this. So they began to theorize, well, there must be something about the way the leg would also turn in a horizontal plane as well as moving vertically and in any direction.

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Inasmuch as Howard had been injured during the course of employment on a military assignment with duty related to military purposes, it was arranged that he report from time to time to the chief medical officer at the Mare Island Naval Hospital.

Since Howard possessed an excellent analytical mind, he deduced that the design of the prosthetic device was a very contributing factor to the undesirable condition that developed. He so informed the naval doctor, who also was very much interested in this development because of the likelihood of many such cases that would occur during the war, and would involve artificial limbs.

The naval doctor apparently concluded that there was a real need to improve prosthetic devices, and so informed his headquarters people in Washington DC. Not long after this, Eberhart and Inman were asked to undertake an extensive project to develop new information for a broader understanding on human locomotion and for a basis for design of improved prosthetic devices that would provide a more effective and less painful use of such devices.

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They really found out a hell of a lot, what with new instrumentation and all. And they had a heavy glass plate on which they had people walk who had artificial legs, as well as those who had regular, undisturbed feet and legs. They found out all the kinds of movements, and these people who were tested of course had strain gauges and stress gauges all over them, too. And they added a great deal to the knowledge of how the lower limbs behave, which had not been known before, and also how to design an artificial limb so that it could act more appropriately and not cause other pain and so on.

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(This is another interesting, and not widely known example, of how the University, through the competence of its faculty and research personnel, contribute to the welfare of the human race.)

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Homburger: You were also involved in the Hamilton field project?

Davis: No.

Homburger: But the Civil Engineering Department had a number of these war projects going on.

Davis: Yes.

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Homburger: Did Professor Eberhart remain in this field for the rest of his active research career?

Davis: Not entirely, but he was often called on in connection with problems in this respect. The kinds of devices they invented for use in the laboratory were also very clever, but Howard went on to, of course, do other things in the structural engineering field, which was his primary activity in the field of civil engineering.

Another footnote on Howard was, that after his retirement, he and his wife took up residence in San Diego--no, not San Diego--Santa Barbara, and some of the people in the engineering department there knew of him and he was persuaded to go on teaching on a part-time basis.

IV FAMILY MATTERS##

Homburger: Was this around the time when you got married?

Davis: No. My first wife and I broke up in '45. I guess we had moved out to Alamo.

Homburger: We don't know yet when you married her.

Davis: Wait a minute.

Homburger: And what her name was.

Davis: Well, Kathleen Wheaton was my first wife, and I married her in 1931. We had three children. I think probably the war had a lot to do with it. I was working day and night, and she was isolated out there, and she was afraid I'd get involved with women or something or other, which wasn't true. So in some kind of a snit, she picked up and went back to her mother. That was in '45. Three years later, I remarried. Companionship is important.

Homburger: And that was Clare?

Davis: That was Clare, yes. I married Clare in 1948.

Homburger: And what happened to the three children?

Davis: Fortunately, Kay and I were able to talk somewhat later about things that ought to be talked about, and we agreed that neither of us would say things which would tend to alienate one from either of us. She was very agreeable to having the children, one or the other, separately or all together, come visit me in Berkeley, and I always took the kids--I wanted them to learn how to live and enjoy the mountains. Every summer I would take them to some part of the Sierra or Rockies or whatever.

So things have calmed down since then. Kay has always been quite cordial, and I think we raised three pretty good kids.

Homburger: Do you want to tell me a little about each of them? Their names, and what's happened to them?

Davis: Well, the oldest one is Lynn Eleanor. She was born around-- well, I'd better look up the exact dates. I'm at an age where I don't carry all the details with me.

Homburger: Approximate dates are fine.

Davis: Well, about December 1933, I think. She came up to go to Cal when she had finished high school down where her mother lived in Southern California.

And Gene, who was the next one in line, Eugene, born in August 1935, also came up and went to Cal. He took some work in the finance field, and he, after graduation, got a job in a financial house in San Francisco, and he's now a vice president of a big stock and bond company which is headquartered in Los Angeles, so he's a VP for their office up here.

Willard came along a couple of years later in May 1942. He was sort of the dreamer. He went to school at Santa Barbara, and he was in that age when kids were discontented about that age, and had a lot of time finding himself. But he finally did, and took some graduate work in computers, transmission of information and that kind of thing, and now is connected with a company in San Francisco which trains for industry people in the computer field. So he's a teacher. He also has taught over at College of Marin.

Homburger: And did you and Clare have any children?

Davis: No. Clare passed on during 1989 after 41 years of a wonderful marriage. One of our neighbors, Phyllis Roberts, who lived about 40 yards from us, lost her husband about the same time. We had casually known each other and respective spouses for about 12 years. One morning Phyllis was starting on a walk, and I asked if I could walk with her. She said "yes", and that was the beginning of a great romance -- we were married seven months later.

V FILLING GAPS IN THE 1923-1946 PERIOD

Davis: I consider myself fortunate that I often got the breaks on the kind of research that was very interesting to me, and which I guess turned out fairly well or I wouldn't have gone on the staff or got promoted later. I was always curious about how things work, and that's important in the materials field. And, of course, I told you what kinds of things I got involved in during the war period.

Homburger: You mentioned about the wartime extension students. But how about the regular undergraduates during the war?

Davis: Of course, they were fewer. I don't think I can recall or probably I didn't detect any marked difference in their ability to learn and progress. I always enjoyed teaching, even when I was director of the transportation institute, I insisted for a long time on teaching at least one undergraduate course, which was soil mechanics. Later, when we got someone to really come in and carry on, which was Harry Seed, whom you may remember, why then I gave up on that and concentrated mainly on graduate courses in transportation.

Homburger: I don't really in this first session want to go further ahead. Is there anything that we haven't covered from the twenties and thirties? What about fellow students, for instance?

Davis: Having started in architecture, although I didn't think what they were teaching was going to help me in the directions that I was interested in or stirred up about, I had begun to know some people there. One of the students was Michael Goodman. Did you ever hear of Michael Goodman?

Homburger: Yes, I knew him.

Davis: He became a very good friend over all the years. We used to get together, dinners and so on. Even later, we often had him up at the cabin.

So I maintained that kind of connection.

...

Homburger: What was the student body like then? Were students being quiet or active?

Davis: My fellow students in the twenties, of course, being in engineering--they wouldn't be in engineering unless they were really interested in something. So I always enjoyed good relationships, and I also was involved somewhat in campus activities. I was on the editorial staff of the California Engineer, that's a student magazine in engineering.

I was elected senior representative to the Welfare Council, and little things like that, so I also had acquaintanceship with people across the campus. And in the early days when I was a student, one of the ways to become acquainted with people was the young people's groups in the various churches around the campus. Because I happened to know somebody who was in the young people's group at the old Presbyterian church in Berkeley, I also became a member of that group and made many friends from that source.

And, of course, you begin to get involved in not only the student affairs in engineering, but as I say, on the campus which also extends your acquaintanceship with people. So I don't think I've ever been shy about connecting myself with people things.

Homburger: Did you live in the White House the whole four years?

Davis: No. Later on, I shifted and got a little old apartment. My brother came up to Berkeley, and he and I had an apartment near the Claremont Hotel, which held us for quite a while there. I can't put my memory on exactly the year that that happened, but I didn't stay in the old White House rooming house. [laughs]

Homburger: I may be more interested than I should be in the fire of 1923, because we've just had the fire of 1991.

Davis: This one was much larger.

Homburger: The other one was mostly on the north side of campus?

Davis: Yes. And it stopped one block from the campus. It was stopped by that time.

Homburger: So your moving the books out turned out not to have been necessary.

Davis: Yes.

Homburger: But many homes were destroyed by that?

Davis: Oh, yes. You know where Marin Avenue reaches the ridge. I think it was somewhere beyond that to the north where there had been a fire down at Wildcat Canyon which had, in the dry part of the year, come up and hit the ridge. Then developed, I think, that day a very strong--it would have to be a northeast wind, I guess, because it took the fire over the ridge and down into some houses out there, near where you are, I guess.

Homburger: Where I used to be. Where you used to live on Miller Avenue.

Davis: I lived on Miller for a while.

Homburger: And that area must have been where the fire was also burning.

Davis: And then we moved out to Kensington after Clare and I married, and lived at Yale and Oberlin.

But anyway, somewhere in that interval, the fire came over the ridge and swept down into Berkeley, driven by this horrible fall wind, and it was a ghastly thing to see that fire working down Euclid Avenue. Great billows of smoke and then crossing the flames and so on.

Homburger: Was there afterwards a movement to change building codes?

Davis: Yes, Berkeley, and I think Oakland also passed a number of pieces of legislation to improve more fire resistant construction. But somehow, this was relaxed, as sometimes happens, and the precautions weren't fully followed.

Homburger: History has a tendency to repeat itself.

Davis: Yes.

Of course, the war didn't really start approaching until after the thirties, although there was disruption by Hitler and company in the thirties, and everybody was concerned about what was happening there. But there's always an expectation you're not going to get involved in that, at least over here, until some incident happens which brings you in.

No, I think when I was in school, I would consider the student body as an earnest bunch of students. There were always some who were light-hearted and flippant and so on. But mostly they seriously went about their studies, and certainly student body activities which were serious, and they carried out very well.

Homburger: How many students were there at the time, do you remember?

Davis: About three thousand. Gee, I haven't thought about that kind of number in a hell of a long time. [laughs]

Homburger: Did you know Robert Gordon Sproul personally in those early days?

Davis: He made it possible for damn near everyone to call him Bob and shake his hand. So naturally, I had met him. Later on, after I got involved in the Institute, I met him some more, of course.

When I entered Cal, or entered engineering--I guess architecture too--William Wallace Campbell was the president. He had been director of the Lick Observatory; he was an astronomer. When he came up to Berkeley to be president, the Campanile had just recently been built.

During World War I, part of the shipment of bells for the Campanile had arrived, and I think he was on board when that happened. He was proud as anything of the fact they had a carillon there, although it wasn't the complete carillon that we have now.

There's a very interesting campus story about that. His successor down at Mt. Hamilton Lick Observatory came up one day to have lunch with William Wallace Campbell, and Campbell took him up to the Faculty Club from old California Hall to go to lunch. About the time that they got to the esplanade, the bells started ringing. If you've ever been on that esplanade when the bells ring, it's quite powerful. So Campbell, pleased that here was this exhibition of something he had supervised--the bells were installed--said to his friend, the director of Lick, "Hear the bells? Aren't they lovely?"

Now, it so happens that the director, whose name I forget at the moment, said, "What?" He was hard of hearing. So Campbell says [louder], "Hear the bells; aren't they lovely?" And the man says, "What?" Well, now, it might break your machine here if I went through the cycle and gave the number of decibels that they went through.

So finally, after Campbell says, "Hear the bells; aren't they lovely?" at the loudest volume, the old boy turned to Campbell and says, "Speak louder, I can't hear you for them GD bells!" [laughter] So that's one of the old campus stories.

Homburger: And then in the mid-twenties, he retired and Sproul became president. Right?

Davis: No, there was a general who became president. But about this time, Sproul came on board. Of course, he was an expert administrator as well as a person who knew people. He spoke in a loud voice, when need be, anyway. He could speak very softly, too. One very hot Berkeley day, Campbell, who had his office of president up the other end, and Sproul was the controller who had his office down the other end of California Hall. Campbell became annoyed at Sproul's booming voice. So he sent his secretary to find out what was going on down there, who was Sproul talking to, anyway? The secretary came back and said, "He's talking to Sacramento." And Campbell is said to have said, "Well, tell him to use the telephone." [laughter]

VI THE BEGINNINGS OF THE INSTITUTE OF TRANSPORTATION AND TRAFFIC ENGINEERING

[Interview 2: November 17, 1992]##

Davis: Before in our conversation, I have brought our discussion through the period of World War II, 1941 to 1945, during which, in addition to giving instruction in my regular engineering courses, I was involved in high-pressure research on war-related problems and in war training activity.

So in this interview, it seems appropriate to discuss the activity in which I was involved during the immediate post-war years. But what I got involved in was a consequence of what happened in the nation's infrastructure during the war years. Those parts of the nation's transport systems which did not contribute to the war effort were of low priority as regards maintenance, and as to any new construction of transport facilities that did not in fact contribute to the support of war efforts. Gasoline was also rationed, so as to decrease the use of oil products that were not essential to the war effort.

This meant that parts of the road networks and parts of the civilian air field inventory fell into various levels of disrepair. In late 1944, as it began to appear that the war might be brought to a successful conclusion within a year or so, agencies responsible for civilian transport began to give some thought not only to the repair of the physical facilities but also to the vehicles that would probably begin to flood the existing roads, streets, and airports, and rapid transit facilities of the nation.

The leaders of the California Legislature and the then-Division of Highways of the State Department of Public Works began to discuss probable needs. In the latter part of 1945 and 1946, there was carried out a very comprehensive so-called needs study, which laid a factual groundwork for the preparation of plans for the rehabilitation and needed supplemental development that would be required for increased usage in a postwar transport complex, and would be required to encourage and support a postwar economy.

In the latter part of 1945, the state legislature already had set up a joint committee of the Senate and the Assembly to work on the preparation of legislation for the conduct and financing of a postwar transport system. This activity led to the noteworthy Collier-Burns Act of 1947. It involved the expenditure of many millions of dollars over the ensuing decade.

As the nature of the plan for this expanded transport infrastructure began to take shape, one of the thoughtful and far-sighted senators involved in the preparation of the new legislation recognized that the magnitude of the effort involved in implementing the new program would require a substantial corps of new, educated, trained personnel to aid in carrying out effectively the proposed program over the years ahead. This was George Hatfield, senator from Merced (a real statesman in my book).

First Steps at Berkeley

Davis: To give some substance to his idea of need to support the new development, Senator Hatfield contacted President Sproul of the University of California for suggestions on what the University might be able to do in this connection. Professor M. P. O'Brien, then dean of the College and Department of Engineering at Berkeley, was asked by President Sproul to prepare a memo providing suggestions as to what might be done.

Dean O'Brien then requested a small group of faculty--I was included--to give thought to and to prepare a list of research needs, and the nature of educational programs, that could be of value in the state action program then to be formulated.

Many of these suggestions were then incorporated in a memo that O'Brien prepared for President Sproul, as to a possible institute-type of organization that could give attention to pertinent problems and provide support for an expanded educational effort in the transport field. These suggestions were then transmitted by President Sproul in his reply to Senator Hatfield. Shortly afterward, Senator Hatfield prepared a bill for action by the Senate.

Senate Bill number 1423, chapter 1573 of the Statutes of 1947, was passed by the legislature and sent to then-Governor Warren. The governor, under authority he then possessed, decreased the amount of financial appropriation which the Senate had included in the bill, but he then signed the bill, thus amended, on July 19, 1947.

This bill, in effect, requested the Regents of the University to establish an Institute of Transportation and Traffic Engineering at Berkeley. The bill also defined the function of the institute in these terms: "Said institute shall carry on instruction and research related to the design, construction, operation, and maintenance of highways, airports, and related facilities for public transportation, in addition to, but not to the exclusion of other appropriate subjects for research and study. The institute shall give attention to the interrelationships of highway design, traffic control, and highway safety." This bill also called for cooperation with the Division of Highways and other public agencies responsible for the design, construction, maintenance, and operation of highway transport and other related facilities for public transportation.

It is of interest to note that the title of the bill referred to an Institute of Transportation and Traffic Engineering. In all likelihood, it was phrased this way to ensure that attention would be paid to the dynamic aspects of transport as well as the physical plant.

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In the early fall of 1947, Acting Dean Everett D. Howe (acting as Dean for M. P. O'Brien, who was away on leave for the academic year 1947-48) assembled a temporary planning and advisory committee consisting of L. M. K. Boelter, Dean of Engineering at UCLA, H. E. Davis, Associate Professor of Civil Engineering at U.C. Berkeley (his field was materials and structures), Daniel M. Finch, Assistant Professor of Mechanical Engineering, whose field was lighting and illumination, Francis F. Foote, Professor of Civil Engineering, whose field was railway engineering, Bruce Jameyson, also a Professor of Civil Engineering, whose field was highway engineering, and Carl Vogt, Professor and Chairman of the Mechanical Engineering Department, whose field was heat power and combustion engines.

...

This committee concluded that it would be possible to begin on several specific research activities to use part of the appropriation funds for establishing new laboratories or augmenting existing laboratories in pertinent areas of study and to begin research in several specific areas without unduly hampering the latitude for program development by hopefully a soon-to-be-appointed Director of the Institute.

...

The bill provided an appropriation of $920,000. Under the authority he then possessed, the governor decreased the amount of the financial appropriation which the senate had included in the bill. He then signed the bill as amended on July 19, 1947. As amended, the bill carried an appropriation of $355,000 for the fiscal year 1947-48, and allocated $225,000 for instruments and facilities at a field station, $50,000 for materials and structures, and $80,000 for administration, including maintenance and supplies.

Separately, Dean Howe had also, on advice from the temporary committee, forwarded nominations for a directorship of the Institute. Howe also had requested the establishment of an account for the Institute (as a section of the Department of Engineering) and that appropriated funds be transferred to this account.

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Now, when new programs are to be started, or academic administrators are to be appointed in the University of California, special committees are appointed to make recommendations to the president concerning the plans, objectives, and nature of the program. Also, a special committee reviews the worthiness of candidates for appointment of a proposed director or an academic position. These committees go about their business very seriously, as they should, and also they take their work not only seriously but they deliberate at length, sometimes rather lengthy lengths.

By the end of 1947, it turned out that a director had not yet been appointed. Those concerned in the legislature were getting rather unhappy. Also, the funds which had been appropriated would lapse if not committed by June 1, 1948. Along toward the end of 1947, President Sproul got a message from someone in the senate to do something about getting things underway.

So President Sproul called upon Dean O'Brien and said, "Do something." I got a call from Dean O'Brien explaining the problem and asking me to "Do something." I still don't know why I was called up. It sounded like an odd deal situation, but it looked like a really interesting challenge, as they say. So I said okay.

By way of doing something, O'Brien and I discussed some things that would be useful and usable, regardless of who might be obtained as the director, and regardless of a future program.

By then, it was getting into February of 1948. I got on an airplane and began to make contacts with people I knew in various universities, laboratories, highway departments, U.S. Bureau of Public Roads, Highway Research Board, and other agencies. I sent back a stream of recommendations for laboratory equipment and names and backgrounds of individuals who might be considered for the director, or as staff members.

In the meantime, Associate Dean Everett Howe was designated acting director, so as to have some authority in Berkeley to sign requisitions for equipment and sign appointment papers. Dean Howe made appointments of the first two members of the staff: Miss Norene Jordan as secretary, and Miss Beverly Hickok as librarian. Miss Jordan, who was later advanced to the position of administrative assistant, set up office procedures as well as procuring office equipment and handling questions and correspondence until she retired in 1985. She was a mainstay in the operation of the Institute.

Miss Hickok began the development of a transportation library that became the outstanding library of its kind in the nation.

Homburger: Perhaps I can ask you a couple of questions about what you've just been saying before we go on. The first one relates to the request for you to undertake this journey around the country. Were you relieved of your regular duties on the campus?

Davis: Yes. O'Brien promised me that all my courses and other duties would be taken care of.

Homburger: And the people that you knew, since you had essentially been in materials and soils, were these people that were also materials and soils, or had they moved over to transportation?

Davis: They were in transportation; but being in materials and soils and structures, I had for a long time known many members of the highway department, since they were a construction agency, and some of the things that we did in our laboratories were of great interest to them. Also, even before this institute came up, I had received valuable information from the head of their research laboratory in Sacramento to supplement some of ours. Also, I had been giving papers at the Highway Research Board of the National Research Council starting back in the thirties. So through that kind of thing, I had known many people who were in various levels and activities in the transportation field.

Homburger: What were some of the major stops you made on this trip?

Davis: As I mentioned, I stopped at various universities to see if they had anything going that might pertain, but as it turned out, we were pioneering. There was no transportation institute of the same kind that we had. There was a Traffic Institute at Northwestern University, which gave field courses mainly for police regarding traffic safety. But so far as I know, there was no institute devoting the kind of attention that we were expected to give anywhere in the country.

But, there were individuals whom I had become acquainted with at the Highway Research Board who were in the highway field. And of course, at the Highway Research Board, and attending the various colloquia and so on, I had become quite familiar with the larger transportation problems other than soils and foundations and pavements.

Homburger: Another question: was it a very obvious thing--was it your idea or was it specified in the legislation that one of the first things would be to start a library?

Davis: It wasn't specifically mentioned, but being in a university in which we had excellent libraries in various fields in which the faculty were active, an important thing to get started on was the basic books and treatises as well as current literature. So soon after it looked like I was going to get more involved, I had requested the appointment of a librarian, and also the beginning collection, so that if we started classes in the fall, we would have a backup of the literature.

Homburger: Thank you.

Davis: Continuing. When I got back, after a couple of months on the road, I thought I had committed all the equipment funds before the funds lapsed. But it turned out later that the university had received some educational discounts on a lot of these items, so that some of the money lapsed anyway. Rats!

It was about at this time that the dean said that "they" hadn't chosen a director yet. He also said that Professor Howe, who was serving as acting director to this point, had to get back to his deaning job, and would I mind serving as acting director for a few months and get some staff on board, because we had to start the teaching program and get it lined up that fall so that courses and teaching would be in place at the time the student enrollment and for the fall semester.

Hm-m-m, I said to myself when the dean broached my taking an acting directorship, I wondered what the hell I might get into now, as well as wondering where I could go after this thing did develop.

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I really wondered whether I was broadly enough informed about the transportation field as a whole to pull this off. As an undergraduate, I had taken Professor Foote's course in railroad engineering, and Professor Jameyson's course in highway engineering. I had a series of courses in structural engineering, which included bridges, trestles, viaducts, and foundations. In my research activity in construction materials such as steel, wood, portland cement, asphaltic cement, soils, and stress studies in bridges, I had met and become acquainted with many professional people in the highway, railroad, transit and airfield activity. Was this kind of experience enough? Hm-m-m again.

But time was running short. Well, I might as well give it a strong try and do what I could for the old alma mater, for what it would be worth.

With respect to staffing, fortune was with us. I was able to persuade Professor Ralph Moyer, formerly of Iowa State University, to join us. I had been acquainted with Moyer for some years through activities in the highway research board, and I knew him as an outstanding teacher and researcher. He was attracted to Berkeley to develop new highway engineering courses and carry on research that he had not been able to do at Iowa.

Professor Jameyson, who taught the undergraduate highway engineering course for many years, was about to retire, and he welcomed Moyer as his successor.

Also, I was able to persuade Donald Berry to join us. He was a graduate of Northwestern University and was then serving as the chief traffic engineer for the National Safety Council in Chicago. He was asked to develop a teaching and research program in traffic engineering (traffic engineering at that time was a relatively young field in engineering). We thus were able to start a new transportation instructional program at Berkeley in the fall of 1948.

Also, knowing a number of people involved in a variety of phases in the transport field, and as a result of contacts made during my trips to laboratories and organizations in many places in the U.S., I was able to zero in on and send back recommendations as to laboratory design, research requirements, and the names of individuals to be interviewed for appointment not only as director but as staff of the new Institute.

The ITTE at UCLA

Davis: At this point, I should like to interpolate some comments on a very important development that would greatly aid in the early development of the institute. Earlier in the 1940s, there had been established at UCLA a College of Engineering. Professor L. M. K. Boelter had become the dean thereof. Prior to this, Dean Boelter was chairman of the Department of Mechanical Engineering at Berkeley. Boelter was a person of constructive imagination, a deep and productive thinker, and possessed of a broad view of the nature and function of engineering in society. While at Berkeley, he had developed a keen interest in the interaction between people and technological developments, especially in the realm of mechanical devices (nowadays we call that field of study ergonomics).

One aspect of this was, of course, safety. It was agreed between Deans Boelter and O'Brien that it would be pertinent and useful to have a section of the Institute in the engineering setup at UCLA. The special role of the ITTE at UCLA was to be concerned with safety matters in transportation.

Thus at ITTE UCLA, the staff included a psychologist and a physiologist as well as engineers interested in safety in the transport environment. By the end of 1948, the staffing of the Institute looked like the following in an excerpt from the ITTE Quarterly Bulletin of December 1948, and it was quite substantial.

...

Organizing and Staffing the ITTE

Davis: With some staffing and some laboratory setup in view, it was time to begin thinking about other things. As soon as appropriate time permitted, I discussed the idea of an advisory committee with Dean O'Brien, who gave it full support and suggested that members of an advisory committee of this kind should be invited and appointed by President Sproul. President Sproul agreed with the proposal. Dean O'Brien and I then got together a list of candidates for appointment to membership on such a committee, which would have a well-rounded representation of many aspects of the transport field. Those who served on that committee at the time it was formed were [are shown in Appendix B].

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A concomitant problem was space on campus for what was going to be a growing staff. In 1948, new office or research space was at a premium on campus. However, for the time being, we were able to get some office space in one of the old "temporary" wooden buildings in the little valley between the engineering building and the main library.

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On this particular kind of problem--that is, space for doing business--along in the late spring of 1948, upon recommendation of some trusted friends, I also engaged Lee Rothgery to aid in the designing and the makeup of plans for a shop and the laboratories which seemed, based on various needs viewed in my trip around the country, would be worthwhile for us to think seriously about.

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While on the question of adequate space, I should digress here to mention something that was to ease both office and laboratory space. In the late 1940s, probably as part of Dean O'Brien's efforts, the regents purchased a tract of land comprising some 160 acres. This property had formerly belonged to the California Cap Company, a manufacturer of explosives, and was located on the near side of the city of Richmond.

The cap works was a manufacturer of explosives, and their war business had subsided. Some sixty acres of the upland were temporarily fenced off for use by various departments of the university for research purposes. Sites were assigned for office, machine shops, and research laboratories, and work in open space for research.

In the early fifties, the ITTE moved to the Richmond Field Station. A building containing staff offices and library had been built according to our plans of the layout. Also established for ITTE needs: a machine shop, a building for housing, and for use as field experiments, relating to roadways. Also established there was a laboratory for experiments with roadway and vehicle lighting and illumination problems, and a laboratory for experimenting with soils and bituminous materials.

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(Fortunately, lucky stars shone upon us in about late 1971, and some office space became available in McLaughlin Hall, that made it possible for us to move the instructional offices and our headquarters institute office into the campus. Likewise, space was found which would accommodate the growing library in McLaughlin Hall.)

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VI DIRECTOR OF ITTE

Davis: Toward the end of the academic year 1948-49, I was somewhat surprised when Dean O'Brien again asked me to his office to talk about something! This time he indicated that I seemed to have put my stamp on the developing shape of the Institute. So, would I be willing to serve as director?

Since I had gradually found myself more and more interested in the transportation field and its many challenging problems, more complex than my earlier expertise with materials and structures, this opportunity had some appeal to me. After discussion of this whole problem with my good wife, I finally reported back and said I was not only willing, but would enjoy the opportunities. So, in July of 1949, I became director of the ITTE.

ITTE Work at the Richmond Field Station

Homburger: You mentioned about the early use of the field station to which you went in '52, and you also mentioned that somebody, perhaps yourself, had actually designed the first buildings that were put up there that were new.

Davis: Let me preface that by saying that a number of other departments also made use of the field station. Some of these were the department of forestry and agriculture, who started a forest materials experiment station there. Professor [Harold] Gotaas in sanitary engineering started a sanitary lab. Professor Folsom started work in water experiments because of the ongoing interest in wave action on shores.

I should also mention that because of Finch's interest in illumination as applied to transportation needs, we made use of a long building which had been established for experiments on illumination in foggy weather. Mist or fog could be generated so as to provide various densities of fog while a car and driver would make through this fog in the building.

At the same time, in connection with airfields, there was some question about the safety of aircraft landing in the dark and in foggy weather, and Professor Finch invented a method of lighting which was later adopted: little low lights in the pavement of such a nature they would not be scooped off in paving operations in snowy weather, and along this long building, suspended what took the place of a cabin of an aircraft. For various conditions of [fog] density and of speed of approach, pilots would give their reports on the utility of these lights, which were then adjusted for various things like spacing and density.

Homburger: I recall that he had also contract with the state to approve all new lighting fixtures for automobiles?

Davis: Yes, and that was done in one of the laboratories that was set up for the Institute. Also, I might say that one of Professor Moyer's great interests in highways was the behavior of vehicles on roads, affected on the one hand by roughness, and on the other hand by driver visibility. Especially of interest and of longtime importance were his experiments on measurements of road roughness and the reports of drivers as to their capability to maintain control under rough conditions. And these then led, as I recall, to some of the specifications by the state Division of Highways with respect to road roughness as well as their means of measuring the roughness of roads.

He performed this research at the field station, and his outdoor testing equipment was then housed in one of the buildings there which also served as the shop which we used to maintain various experimental equipment.

Homburger: Going back to the lighting lab, I recall that Professor Finch got to keep the samples of new headlights, taillights, and so on that were sent by the manufacturers for approval, and that somebody made some very interesting Christmas trees out of them at the right season of the year.

Davis: Well, I think there was that matter of getting rid of this excess stuff which probably would not be used again. I don't recall the Christmas aspect of it.

The Library

Homburger: Let's go back to the library which you mentioned became one of the great libraries. Was a substantial part of the total budget of the Institute devoted to building up this library?

Davis: I wouldn't say it's a substantial part. Each year, of course, it was a part of the annual budget. I should point out that, after the initial expenditures from the initial bill, the Institute budget was a part of the university budget, and then was handled by my submitting a proposed budget to the dean who then submitted the entire College of Engineering budget to the president.

In those years, we were very well dealt with, because I think it was recognized that this whole thing had to get underway and be successful. You were there in later years, and you probably know some of the budgetary difficulties when times got tough.

Homburger: That's where the phrase "good old days" comes from.

Davis: I call them the golden years.

Homburger: Yes, indeed. So, the library was able in those days to build up even without too many funds?

Davis: We had donations from many people. I will later talk about working with the big advisory committee, and they with us, and through their interest, I think we received many donations from the outside.

Creators of the ITTE, 1945-47##

Homburger: Let's go back to 1947, and that first postwar Act of the legislature which became known as the Collier-Burns Act. Do you want to talk a little bit more about how the Act defined a new highway program for California?

Davis: I think we'll probably have to go back to mid-1945, when some of the leaders in the Senate, notably Collier, Hatfield, and some others, had recognized that sooner or later it would be necessary to have some kind of a program and the legislation necessary to put it in motion. And that involved or caused the setting up of this joint committee so as to involve both the Senate and the House, and therefore a better chance for passing the bill, and taking less time than if the Senate had passed it alone.

Through some source, Senator Hatfield had learned about the Brookings Institution in Washington, D.C., and they were beginning to do several pieces of research related to transportation, mainly on the economic side, that is,

economics, taxation, and so on. Inasmuch as Dearing was an economist.

Homburger: Who was this?

Davis: Dearing, Charles Dearing. He also had as a young associate there, a young man, Wilfred Owen, who was also an economist and had a deep interest in transportation, and before coming to Brookings Institution, he had written some papers which attracted the favorable attention of the authorities in the Federal Highway Agency.

It occurred to Hatfield that it might be appropriate to ask Dearing to come out and talk to the committee--I think it was the whole committee, although certainly it was to Hatfield --in order to get an economist point of view, and some of the pitfalls in developing an extensive highway program, which Dearing did. Through that connection, I don't recall now whether it was by Dearing's suggestion or not, but Hatfield also made contact with the Automotive Safety Foundation, which was headquartered in Washington, and which had an excellent staff of highway and traffic engineers to advise them on the interrelationship of highways and vehicle travel.

After the bill was passed, which was in mid-'47, and in the preparation years of the last half of '47 and '48, on Hatfield's recommendation the then-Division of Highways had a contract with the Automotive Safety Foundation people to make a so-called highway needs study, where they made something out of the highway needs terminology. Later, it was rather scoffed at because it was alleged that anybody could make up a need if they wanted to sell something.

But at any rate, they made a very thorough study of the condition of many of the roads, county as well as state, and streets in California, and presented a then-pioneering report to the Division of Highways concerning the state of the highways and some of the measures that might be taken. This was very useful then in the Division of Highways with their people to prepare the details of the planning for the next decade. All this time they had contacts with the legislative leaders on this matter, so that there was a union of ideas then.

And so that period between the passage of the Collier-Burns Act and into the year '46, the actual proposed highway program, the technical one, was prepared. So these are some of the additional things which went on in Sacramento.

Homburger: As I recall, that Collier-Burns Act also arranged for future financing by raising the gasoline tax.

Davis: Yes. They also, of course, had to determine what the probable estimated cost would be, and to find the financing for it.

Homburger: Also, there was perhaps already before that, but certainly at that time, a jealousy (if one could call it that) between northern California and southern California. Did this legislation require the Institute to have a southern California branch?

Davis: The southern branch--or southern section of the Institute, I think as we might better call it--establishment arose from an entirely different set of circumstances. In the 1940s, the University of California at Los Angeles, which had been already established by then, decided--

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--to establish an engineering department. Llewellyn Boelter, who was in the department of mechanical engineering at Berkeley, was asked to be dean to develop that engineering department, or school, College of Engineering at UCLA. Boelter was a great thinker, and sometimes it got him into trouble. But at any rate--

Homburger: What sort of trouble?

Davis: With some of the forward-looking ideas that people thought were crazy. [laughs] At any rate, he thought that in engineering, greater attention should be paid to the human factor in whatever it is: in industry, and wherever humans contacted the technological devices, whatever they may be. He wished to and did develop a staff, psychologists and physiologists as well as engineers, who were doing things that might also be useful in transportation. So he and O'Brien talked about that, and what they decided was to have a section of the Institute at L.A. which would give attention to the human factors in transportation, especially the question of safety.

And of course, that gets into the fact of some importance of knowledge of traffic engineering, as well as general features of traffic, and the control of traffic by police.

So a very interesting section was developed there. It was really fortunate that that was the thrust, because that would mean there would be no competition between two still relatively small sections of an institute separated by 500 miles. And

they did some very fine work there, as you may know, in the matter of safety.

Homburger: Back to the Collier-Burns Act for a moment: this was just the first of a series of major transportation acts?

Davis: Yes, there were subsequent acts, and there were subsequent acts that pertained to the Institute.

Homburger: But in terms of the acts that pertained to general policy, am I correct in believing that by the time the next act came around, there was a lot of input from Institute staff?

Davis: There were two aspects to that. In the first place, because of problems of more and more heavy trucks getting on highways, which involved pavement wear as well as safety, there had been set up an Interstate Committee on Highway Policy Problems, so that it would avoid the business of any one state setting up a barrier to the through flow of cargo. And that was quite a committee, and I and Dick Zettel, who was the economist on our staff, were asked to serve as advisors to that Interstate Policy Problems Committee, in which incidentally Collier took a very prominent part, because he was also interested in the trucking problem and the question of financial barriers to flow of goods. That was one aspect where one or both of us were called on to directly apply or give some information.

A second aspect of this was that Dick Zettel[1], who--or, let me tell you something about Dick Zettel first. Dick Zettel was an economist from the University of Washington, and his interest was in public finance. I suppose by the way the die is cast, he had gotten interested in the question of transportation finance and financing, possibly because of his knowledge of Dearing and Owen at Brookings.

At any rate, after he had graduated from Washington State U., I think it was, although it might have been the University of Washington, he worked for the Pacific Gas and Electric Company on how to compute rates, and how justifiable they were and so on and so on. While he was still there, he made quite a name for himself, and he was asked to come to Sacramento as a staff member for one of the committees, I believe in the Senate, and that's where Collier got to know him, and that's where I got to know him.

However, the Sacramento job, of course, was up and down, depending on what was there and so on. It was about at that

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[1]See also the interviews with Richard Zettel in Appendix A.

point--I had heard of Dick Zettel, and he was highly recommended by Collier as a very able man--that I talked over with Zettel whether he would like to get into the kind of thing the Institute was doing, and he was interested. So he joined our staff.

Homburger: And subsequently he and you advised the legislature on these future--

Davis: Well, informally. He or I or one or the other were asked once in a while to come and make comments on certain kinds of policy problems.

Building the Staff at ITTE

Homburger: While we're on the subject of the staff build-up, you've mentioned Professor Moyer, Professor Berry, and Dick Zettel. Who else joined the staff in those early years?

Davis: Dan Finch, whose specialty was illumination, came on in July of '49. Bob [Burdette] Glenn I got from Oregon State College to look after our extension program. Bob Horonjeff we got in December of '49. He had been an engineer of pretty good grade at the Corps of Engineers, specializing in airfields. And let's see: [Research Engineer] Jim Kell, 1954; [Prof.] Norm[an] Kennedy in 1950.

Homburger: They were both in Traffic Engineering?

Davis: Yes. Dolf [Prof. Adolf May]--oh, Dolf didn't come in until '65. [Prof. Carl] Monismith in 1950. I mentioned Rothgery. Wayne Snowden early in 1950. Harry Seed in '51. Now, I had looked after soil mechanics and foundations, and obviously with the way this institute was growing, I could no longer do the direct research in that, although I taught the soil mechanics course for a couple of more years. Meanwhile, we had gotten in the Civil Engineering Department a lead on Harry Seed. So he was brought out here in early '51--

Homburger: From where?

Davis: I don't remember whether he had just finished up at MIT [Harvard?]. I'd have to look that much up. But at any rate, I turned over to him all of the activity in soils then, and he later broadened it to geotechnical program. A damn good man, incidentally.

Zettel came on in '51. I'm skipping a lot of the non-academics here, although Russ Newcomb, who was an excellent instrument-maker, came on in '49, in the shop.

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Introduction to the ITTE Extension Program

Homburger: One of the earlier staff members was Bob Glenn, tell me a little bit about the development of the extension program.

Davis: After we'd been in operation for about a year, Hatfield invited me to have lunch with him over at Merced, and asked me how we were getting along, and was highly pleased at how it had started and so on. Apparently, he had been deeply interested in this kind of development, or he never would have, I guess, got the committee to pass a bill.

He told me some of his hopes and aspirations of what the Institute might do. No pressure or anything; he was just talking about his dream, I guess. He pointed out that in his opinion, in the local jurisdictions, cities and counties, there were many individuals who, while they were honest and trustworthy and knew something about roads and bridges, had no way of keeping up-to-date on developments that would improve both the quality and the cost of providing facilities. And he had hoped that we would find some way to feed information to them.

That was very early in the game he did that. I think it was only after a year or so we'd been going. Incidentally, in the memo that O'Brien wrote to President Sproul, he also mentioned the idea of an extension program, as well as an academic program, which I already knew also.

But anyway, that sort of emphasized this. And so the problem was to get the kind of guy that could do the job.

Being on the West Coast and knowing a lot of the guys in the materials side of the highways, I knew several of these people at Oregon State, and they had a fairly good engineering school there. So somewhere, either from them or somebody, I had heard of Glenn, and I don't know what the reason was, but he was kind of getting fed up in the job there, because he was professor of highway engineering on the academic staff, but he wasn't getting promoted, and so he just drifted along at the same salary.

Glenn wasn't that type that wouldn't do something, but I think he got involved in helping the state highway department with information, and so he wasn't always available on campus when somebody wanted to say something.

I forget the exact source, but I heard of this, and had a chat with him, and he sounded like a very personable guy. You probably know he was. He was a very simpatico type; he would listen to guys' problems and so on.

So he agreed to come down here. And let's see when I put down Glenn here [consults list]. July 1, 1949. So he did a great job. With this extension program and the kinds of things that we did--the annual road school, we originally called it, and also Glenn's service as sort of a farm advisor type of thing (if a county engineer had some problem, why, he could talk to Glenn and usually Glenn knew enough about it to help those guys)--we developed quite a following, and the city and county engineers just thought that we should never have any problem with having enough money to carry out this program.

One of the strict rules in the university is that we may not solicit money. This is the role of the president and his designated person, like Jim Corley, who was then controller, and the representative of the university in Sacramento.

Homburger: That was the rule back then.

Davis: Oh, yes...I'm talking about petitioning the legislature or having pressure on the legislature, which would affect the whole university budget. I'm sure that's still in force.

And because of some of these local guys, including [county] Supervisors and so on, when they saw Sproul who would speak highly of the Institute and what it was doing for them, I think he and Corley came to recognize that we had a constituency. I think they kept a pretty good watch on what we might be doing about on the sly getting an urgent question or proposal from the county engineers or somebody to give us more money. Well, recognizing that, I just stayed away from that kind of problem.

Did I ever tell you about my being at a hearing that Hatfield and the committee on transportation had in San Francisco?

Homburger: No.

Davis: Well, about a year after we started, and this Collier-Burns program was going, the committee and Hatfield had a hearing in

San Francisco on the progress thereof, and also because the Institute was then underway for a year or so, I was asked to report for the Institute, because money had been appropriated at the same time they passed the Collier-Burns Act.

And so naturally I showed up, informed Sproul orally that I was going. So when my turn came, I was called up, and incidentally, Corley was sitting right in the front row. After I finished reporting what we were doing, why, Hatfield says, "Why, Professor Davis, you need any more money?" Jesus Christ. There was Corley staring at me [laughs].

So I thought of a good idea. I said, "Well, Senator Hatfield, you know, we think this kind of activity is so important that we would work off a cracker barrel." He got the idea, and they all got a laugh. Corley was pacified. [laughs]

Homburger: And did Corley then go after more money for you?

Davis: Well, I don't think anything special. I think that was one reason our budget sailed through quite easily, because Sproul and Corley knew that we had a constituency and knew that we were doing a job that was getting recognition that was good for the university. So I think it all tied together, but we never had to come down to cases. Those were golden years. I would submit a budget via the dean to the president and so on, and usually we always got what we asked for. Now that isn't the case.

Homburger: You made a brief reference to the road school, which of course has been an important part of the institute. Do you want to talk a little bit more about that?

Davis: Well, it seemed to us, and Glenn thought it was a good maneuver also, that in addition to having short courses and special seminars and so on for individuals up and down the state and carrying it up and down the state, it would be a good idea to have one annual meeting in which we could bring important people, either from other parts of the state or other parts of the country, and put on a conference which had to do with problems and solution to problems relating to highway and airfield development. The first one of those was put on, oh, perhaps a year and a half after we started.

Now, the only other big highway-oriented program in the country was at Purdue. They did a great job there for their state. They had annual road schools. And so we called this the road school, though they had another formal name. The county engineers, I guess, liked this, so they often referred

to it as the road school, but we never used that name in formal announcements.

Homburger: And it became an annual event?

Davis: Yes, it became an annual event. And as you can see, they now tell how many--what their birthday is each year.

Homburger: Yes. Senator Collier's name has come up several times, but you've mostly talked about Senator Hatfield.

Davis: Collier was very much interested. I think along with Senator Hatfield, he probably considered himself as one of the forebears of getting the institute going. I don't know in detail how much he did, but he was always most friendly. I think another reason was that he had Zettel do a number of financial studies, and he valued Zettel's work, too.

Homburger: It seems to me very curious that the interest in Sacramento was mostly in the Senate, which in those days was a very rural body--we didn't have one-person, one-vote yet, so the rural counties were overrepresented in the Senate--and that the Assembly, which was much more urban, didn't seem to show as much leadership in setting up the Institute.

Davis: I don't know exactly why that should be true, but it was the fact that a lot of the leadership came out of the Senate. And if that be true, I think between Hatfield and [Hugh M.] Burns, they were the sparkplugs.

Homburger: Burns is a new name. That was an Assemblyman?

Davis: Burns was an Assemblyman, and they were the joint chairmen of the joint committee...Collier was really a ball of fire. Got himself into trouble some ways, too. But Hatfield, as I mentioned earlier, was really the thoughtful guy. He was interested in the welfare of the state. So many of the members of a legislature are interested mainly in taking home some kind of money for some improvement in their own jurisdiction. But so far as I could see, Hatfield was really interested in the welfare of the State of California.

Homburger: Do I recall correctly that he died just a few years ago, and was honored at a meeting in the Bay Area just recently?

Davis: I don't recall that honorary function, but both Collier and Hatfield passed away quite some time ago.

Homburger: Oh, then I'm thinking of another early supporter of the Institute that was a senator.

Davis: Oh, Breed, Arthur Breed.

Homburger: Ah. What about him?

Davis: Well, he was a supporter of the Institute, and there's an interesting story about him. The Senate passed the bill to establish an Institute at the university finally toward the end of the session that year. There was then the problem of getting the concurrence of the Assembly in order to be able to send the bill to the Governor for signature.

I think it was Breed who was called on by Collier at the last minute--it was nearing midnight of the last day of the session--to take this bill by hand over and get the Assembly concurrence of it, which Breed did. So Arthur Breed always thought that he had a hand in being a father also of the Institute.

Homburger: And in a literal way, he did.

Davis: Yes. He saved the bill. And--although he passed away--he came on the board of the auto club about the same time I did.

Homburger: Since you've mentioned the auto club, were they at all active in supporting this original bill?

Davis: I believe they were. It was interesting that the bill had quite a few supporters, such as the State Department of Public Works, and--well, I forget now some of the others, but it had a pretty broad outside support.

Homburger: Do you remember who was the director of the State Department of Public Works in those days?

Davis: Purcell.

Homburger: Charles?

Davis: Charles, Charlie Purcell, yes.

Homburger: And he was very active in this process of setting up the Institute as well?

Davis: I don't know to the degree, but certainly I think Hatfield consulted with him, because Hatfield tipped me off that one of the early things I should do is go around to some of the state offices and introduce myself, and say what we were doing and hope that we could do this in a way that would be of value to them. So one of the first guys I visited was Charlie Purcell.

The Department of Public Works had a lot of things besides highways in it, but Purcell's background was in highways, and he had been the guiding light in the Bay Bridge development. He was the head man on that to get the engineering side of it going. And he must have passed the word on down, because gee, all those top-notch guys in the upper crust of the Division of Highways were very friendly.

This was fortunate, because when we started that extension program, and carried around small courses up and down the state, and since they also wanted their people to attend, some of their younger people, they provided some of their staff without charge to give lectures for us. So that was a nice bit of cooperation on their part, although we also had cooperation from their laboratory. So fortunately, the whole department knew of what we were doing. I guess Purcell passed on the word.

Creating the Academic Program

Homburger: Why don't we turn for a moment to the same period, but what was going on on the academic side, the setting up of a program of teaching transport engineering at Berkeley?

Davis: As I mentioned, O'Brien was able to move things around so that there was also a Department of Engineering. A college merely looks after certain academic things, like recommending that somebody be graduated and so on after all the evidence is presented. But the departments are the administrative units, and so O'Brien saw that, and he achieved then, as they began to bring the various colleges of engineering one kind or another together, that there be a Department of Engineering.

Naturally, he had a very close interest in the Institute. We often talked about what was going on. So he took the steps at my request to form a Division of Transportation Engineering in the Department of Engineering, and incidentally, he asked me to be chairman of that transportation division.

Through that division, we could also take the steps, and as a chairman of a division, as part of a department, I was able to make the recommendations that people we brought on who had the qualifications would have a dual appointment of instructor or lecturer or associate professor or full professor or whatever. This was important not only to provide the academic stature of someone who's going to teach, particularly advanced courses, but also to help supplement our direct

Institute budget, inasmuch as the salaries would be split, and the professorial salaries would go up through the Department and the research salaries through the Institute.

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Davis: Another important aspect of having the dual kinds of appointments of research persons in the Institute and teaching personnel in the academic division was that practically all of the appointees that we had did both teaching and research. This meant that there could be a direct feed of information developed from research into the classroom instruction, so that it wasn't the case of a lonely professor trying to get new information.

One of the desirable aspects of this extension program, which Bob Glenn really put into practice, was to bring back from his observations of problems in the field on traffic, highways, bridges and so on, to the rest of the academic staff notions for research or useful notions developed in the field for instruction purposes. And I considered that a very important feedback from having an extension program.

Homburger: The academic program that was developed at that time was all new?

Davis: No. This was to take up and enlarge what had been done in the earlier Department of Civil Engineering for many years. Francis--we called him Frank--Foote was professor of railroad engineering and had been for many years. Bruce Jameyson taught highway engineering, although many times he was part time because he was also bridge engineer for Alameda County, and some of those bridges across the estuary had a big input from Jamey.

So when the Institute came along, Foote was about to retire anyway, and Jameyson was also nearing retirement--this was where Moyer fit in on taking over the highway [engineering program] because Jamey was retiring. We never did formally establish a railroad engineering program.

But the idea was to have a complete undergraduate program in transportation insofar as one of the specialties in civil engineering is concerned. There are other options. One was soils and foundations, another option was the structural engineering, another was hydraulic engineering; another was sanitary engineering, and so on. So we were the transportation option of the undergraduate program, so that students as civil engineering entering students could choose an option, and we attracted quite a few that way.

The question of a graduate program was a rather different situation. In the first place, some of the requirements interposed by statewide committees and the graduate dean required rather high standards which didn't quite fit engineering. And the same thing was in the master's degree, the master of science.

So what we finally got arranged was a professional program in the graduate field of transportation leading to a master of engineering and also a doctor of engineering. And of course, this was important in order to attract students who would be graduate students. They came here for graduate work, as you know, from many other universities in the U.S.A. as well as from foreign countries.

We had pretty much the ability to design what the graduate programs would be. So in that way, the Institute was a supporter of the instructional aspects.

Another kind of support to the instructional side of the activity was the library, and you probably yourself remember what use was made of the library by students, both in coursework and also in the theses that they had to write for these degrees. And also, I think the instructional personnel received a lot of help, such as typing and so on, from the Institute. So to a considerable extent, the Institute was a boon to the academic program.

Homburger: Not the least of which was that you identified some of these new faculty members such as professors Moyer and Berry, which might not have ever happened in the absence of an Institute.

Davis: I think it was a two-way street. They may not have ever come as a research engineer, without any academic position, which they valued highly also.

So by the time Don Berry invited you to join us, we had quite a staff, I think. Naturally, as some of the first staff became older and retired, others were recruited and came in.

Homburger: Do any of the very early students stand out in your mind?

Davis: Well, see, one of the, let's say, benefits of old age, not only you don't have to remember everything, but you can't remember everything. [laughs] So if I glanced over a list and roster of some of our students, I could easily identify some of them. But we did produce some very, very good students. We are proud to have had those students.

Homburger: What did you yourself take up as a teaching area?

Davis: After the Institute was going?

Homburger: Right.

Davis: Seminars, graduate seminars. I was interested in the highway planning side, and that merged also into highway policy and administration. And then on the financing and taxation side, of course we had Dick Zettel, and so sometimes we'd give part of a graduate seminar to introduce the finance side. I became greatly interested, for my own curiosity, in the kinds of administration required in the transportation business. So I spent a lot of time studying by myself on that, as well as getting much interested in policy formation and what kinds of policy, and how policies were made and so on.

And, after a couple of years or so, when we got Seed in there, I turned over all my activities, both graduate and undergraduate, in the soil mechanics area to Seed. But I always felt that I wanted to do some teaching, and didn't want to be shut out of that side of life, because to me the development of the younger students was interesting.

Homburger: Do you have any anecdotes from that period there, the late forties until about the early fifties?

Davis: I guess I've given you several of them that come to mind. Offhand, I don't recall any others worth repeating.

Homburger: During this whole period, O'Brien was still Dean. He remained Dean for quite a while?

Davis: Oh, yes.

Homburger: And was very supportive of the Institute.

Davis: Yes.

Homburger: In those days, of course, the university being a lot smaller, you also had more access to President Sproul?

Davis: Well, on anything that had to do with budget or appointments, promotions and so on, there's a mechanism in the university for that. So one doesn't have direct contact. Otherwise, the president would be overwhelmed by hundreds of people all wanting to talk about his little problem. Although Sproul knew me and always called me by first name. In budgets and requests for appointments and so on, the ladder was that the department would go through the overall department, and that would go to the president's office, and then that would be distributed,

whatever it was, to appropriate committee or appropriate member of the president's staff for comment.

One of the interesting academic committees of the campus was the committee on policy and budget, and I had always felt it was important to take some part in the total university activity, so I served a number of years on that policy and budget committee. And it was to that committee that requests by departments for appointment of somebody were referred. And then that committee would appoint a subcommittee to do the detailed work of looking into and checking on these things, and writing up a recommendation on why or why not. So I got quite a bit of campus experience from that kind of activity, although I was on some other academic committees.

Now, O'Brien encouraged all of the staff wherever they could or had, I guess, the personality to do so to take some part in the campus activity.

Homburger: And what was your role in supervising the Los Angeles section?

Davis: I served as the statewide director, and we had--whatever you want to call it--a section or what other subdivision, I think the names of the subdivisions have changed. We had a section at Berkeley and a section at Los Angeles. And we had an assistant director at Los Angeles, Harry Mathewson, who had a traffic background, but an interest in human factors. And Norm[an] Kennedy was the assistant director at Berkeley.

Homburger: Did you have to spend much time in Los Angeles?

Davis: Not an awful lot, but it was important to do that. I went down and became quite familiar with all the research work they were doing. They didn't do an awful lot of teaching; Mathewson did some. And one of the others down there did some. But theirs was a unique and unprecedented type of program in human factors in transportation.

Homburger: What were some of their specific projects?

Davis: One was automobile crashes, and how to protect the driver or passengers. Through somebody in Los Angeles, they were able to get permission to crash some cars down there, even before it was done someplace else. And they had dummies who were set up and instrumented to determine the kind of injuries that might develop. They did some excellent work on collisions.

And at the other end of the scale, when ramps were used for our freeway system, you'd find somebody going up an offramp. This became quite a problem in some areas, people who

weren't familiar with how a highway operated and so on. So they made quite a series of field tests on the kinds of signs that would attract enough attention to stop--unless somebody deliberately disobeyed--the upgoing car from coming up a downramp. You see those signs all over now. And they did other work on signing.

Homburger: I understand that they built a driving simulator.

Davis: Yes. That was useful in getting reactions to various kinds of signs. They did work on other signs than that "stop, don't go up the onramp".

Yes, Wolf, I think that maybe we should get more input on the UCLA work as a part of history. I don't know whether we can get ahold of some of those chaps or not, although I could dig out some of our early reports which included their activity. Let's try and do that.

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The first ingathering of state and local highway engineers, "The Institute on Street and Highway Problems." Harmer Davis addresses group, Berkeley, 1949.

Harmer Davis, ca. 1957.

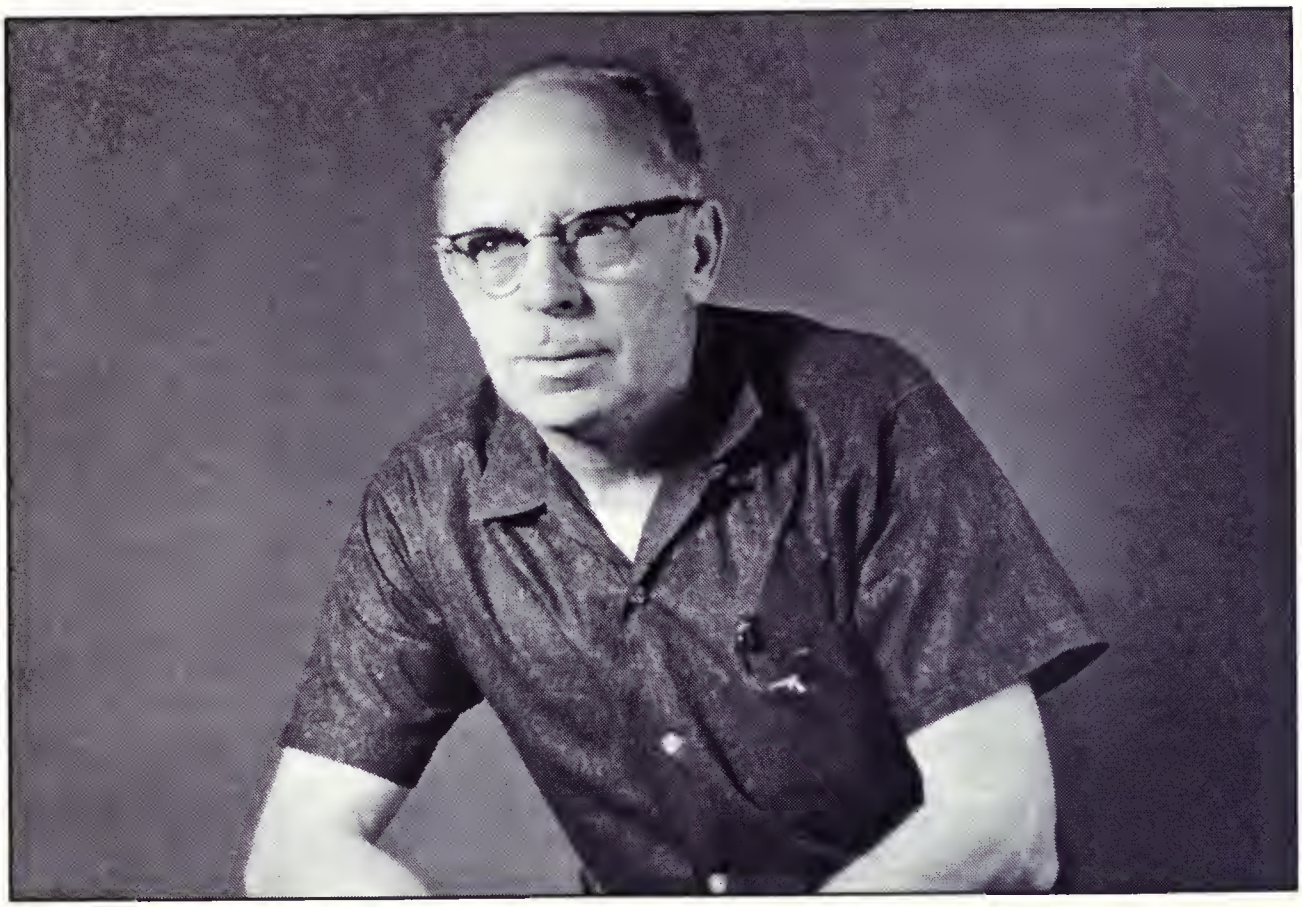
Left to right: Robert Horonjeff, Bob Glenn, Harmer Davis, Richard M. Zettel, 1957.

Left to right: Norene Jordan, the original administrative assistant; Harmer Davis; and Beverly Hickok, the founding librarian, ca. 1967.

Harmer Davis, ITS Christmas party, December 1995.

Left to right: Harmer Davis, Barney Vallerga, Adolf May, Victor Sauer, unidentified, April 1996.

Wolfgang S. Homburger, 1992.



Richard M. Zettel, ca. 1970.

VII CALIFORNIA IN THE LATE 1940s

Interview 3: December 2, 1992##[1]

Homburger: Can we draw a picture of what the California transportation environment was like? You've referred to the deferred maintenance and poor conditions during the war. Of course, there was a much smaller population. I don't think either you or I can make an exact guess right now what it was, but maybe half the population we have now.

But, both as a student and later on, you must have, say, driven between the Bay Area and Los Angeles quite a bit, what were the highways like? How long did it take? Was it something that you at that time already hoped you could improve?

Davis: Well, there are several matters that affect how transportation performed in California. One, of course, was weather, and when there's no maintenance, the deterioration is more rapid. California is a very long state, as you know, and therefore experienced all the way from, one might say, high mountain country to very low seashore country. And likewise, from rainy sections in northern California to desert conditions in southern California.

So the environment in which a highway system or even a railroad system and also the airways had to perform ran the whole gamut of the environment of the surrounding conditions. This, of course, meant that such highways as were built, some of them had pretty rigid specifications for maintaining their quality. Likewise, after the close of World War II in '45, and as the civilian economy began to get going, there was really a flood of automotive vehicles, trucks and cars on California highways, which produced a big burden on some of them, and early indications of the kind of congestion that we have. But

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[1]The first portion of this interview--Tape 5, side A and the first part of Side B--duplicate and revise previous material, and has been melded with material from Tape 3 above.

I think at that time, not such a large proportion of the population would be using their cars for long trips.

That problem of heavy usage and congestion began to show a little bit, so that was another aspect affecting highway transportation--not just the roadway, but also the conditions of movement on the roadways. Not long after, in the fifties I think it was, a very extensive study was undertaken by the Division of Highways to establish formally a freeway system for California. This action, which was in addition to what had been visualized in '46 or so, was a very extensive development. New freeway standards were developed. The problem of the traffic problems made the traffic engineering activity still more important.

Also important was the fact that the automobile traffic began having a large effect on both performance of the streets of cities and also on the costs of automotive transportation as congestion grew. So all these various impacts really kept the problem of highway transportation in the forefront.

Later on, of course, we had developments such as BART, which improved the more rapid movement between the East Bay and San Francisco, and also had an impact on how people concerned with transportation should view the overall use of transportation modes.

Homburger: How long did it take you to drive from Huntington Park to Berkeley in those days?

Davis: It ran to anywhere from four or five to eight hours.

Homburger: You could do it in such a short time, even then?

Davis: Well, if you had a car that would stand it, you could drive rapidly on some of the then non-freeway roads, and didn't want to rest or anything, perhaps you could make it in five hours. But mostly I think we would take eight hours or more.

The Role of the Automobile Clubs

Homburger: I recall that perhaps the first traffic engineering in California was done by the two automobile clubs. Were they an early participant in Institute activity?

Davis: Yes. I'll mention more about this later, but we had on our advisory committee appointed by the president the

representatives from both the [California State] Automobile Association and also the Southern California Auto Club. The executive vice president of the California State Auto Association was Edmund W. Moore, who was a far-sighted man who had good ideas, who knew how to work with people. As a matter of fact, he, in my opinion, actually brought that auto club into the modern age. He had a philosophy of service to members. But he also had a great interest in the road system and the use of automobiles upon it. So he was a strong supporter of attention to the traffic engineering side. As a matter of fact, he had a traffic engineer on his staff, Bob Graver, and he was also interested in other aspects of it. He was one of the promoters of the scenic highway marking in California.

Before he became the executive officer of the California State Auto Association, he had been, among other things and in addition to his basic duty as attorney for the club, the legislative representative of the club in Sacramento. At the time that the Institute was proposed by Hatfield, Ed Moore thought it was a good idea, and he gave that strong support. There were, of course, others who supported the Hatfield bill, but you've mentioned the role of auto clubs and so on, and Ed Moore really supported that.

In southern California, the automobile club there also had a strong interest in highways, and as a matter of fact, one of their chief executives was Joe Havenner. That led to much more attention because of his interest to transportation problems. Both the clubs had a strong interest in highway safety, of course, as one of their services to their membership, and I believe they were early supporters, if not instigators, of the use of highway patrols by volunteers, particularly at school times and near schools. So that was a big contribution to the safety side.

Another aspect of both clubs was the field service for servicing broken-down cars. This started early on, way back I guess in the early 1900s, when they were got together by automobile users of early cars, and roadside service became an important service of those clubs. Now, it's quite sophisticated, and in addition to simply having a truck go out to help the victim of a breakdown, services such as testing for smog is carried on by both clubs, with very excellent testing equipment for smog and also for other factors that help the user by either receiving advice or being guided to kinds of appurtenances for their cars.

The advisory committee also had some representatives from the trucking industry, which also were highway users.

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Developments in Other States

Homburger: At the time when California was taking this initiative and saying, "The way we can solve these problems that have accumulated is, among other things, by establishing a research and teaching institute," were any of the other states doing the same thing? In your travels, did you find out about other states being equally, let us say, praiseworthy?

Davis: I think we were the early one in establishing an institute of this kind. There was a traffic institute at Northwestern University, but their focus was on training police personnel. Now, of course, that contributed to safety, but its emphasis was certainly far different than that of the ITTE.

Another early development was the traffic engineering program at Harvard, and being that it was the first one in the field, that really placed some attention on traffic engineering. It was by them that I would say most if not all of the earlier traffic engineers had received their education, and they did a very splendid job. They also conducted research.

Homburger: But then they moved to Yale.

Davis: Then it moved to Yale, yes.

Homburger: Did you feel when you were first exploring the establishment of the Institute and making this trip around the country, that California was way ahead of the states that you were visiting?

Davis: In the way of highway development, yes. As a matter of fact, the reason that the roads were so poor in some states like Pennsylvania was because the Pennsylvania Highway Department, I guess, was not only held down in the way of appropriations for the state road system, but also they had lots of political pressures there, and hence the private toll road in Pennsylvania. But many other states also, particularly the rural states, were not very far along on their main highways.

The question of financing was also an important aspect of all of this, and I think we have to check that, but the first gas tax was in, what, 1921, or thereabouts, in the state of Oregon, which then placed the cost of a highway on the user,

had a requirement to support at least in part the facilities which he was using. That kind of thing also brought about a big new interest of the economists, in the whole area of public finance. And Dick Zettel had his collegiate studies in the area of public finance.

So it's a very complex kind of thing, this transportation business, and it has many facets of history also. I am reminded of a quotation of an early philosopher which was later translated to something like this, that those who know no history are doomed to repeat the mistakes of the past.

Financing the Institute and the Highway Program

Homburger: You mentioned a number of individuals and groups that were very supportive of the establishment of the Institute. Do you remember whether there was any opposition to it?

Davis: I don't recall that there was.

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Homburger: Then, why did Governor Earl Warren cut the original appropriation so much?

Davis: I don't know the factual reasons, but I think it was obvious that a $950,000 appropriation to get something like that started was rather high. You'll notice that the final finances which he did approve and therefore signed the bill weren't very far off from what we could do in that period. But of course, what they would have done is to simply put on another fiscal year on the thing, I would guess.

Homburger: The Collier-Burns Act, of course, also restructured the financial resources for highways, doubled the gas tax, I believe?

Davis: Yes. There was a substantial increase in gas tax at that time. In the early development of roads, in the cities these were simply expenditures by whatever municipal government wanted to give. In the rural areas, we had a very interesting situation in which, if roads that passed a particular farm, the farmers

had to pay a road tax, and they could either make that possible by doing road work or putting in money.

So here was the question of the users paying. And of course, that was an important access facility for the farmers to get their produce to the railheads, if they were selling it. Roads were extremely important. And in the early efforts to set up a Bureau of Public Roads, that was recognized, and special appropriations were made to supplement what the farmers would do.

I don't know when the use of the road tax for the rural areas actually stopped, but I rather think that as they also paid gas tax, that it wasn't any longer necessary, nor would it necessarily guarantee good quality roads by simply relying heavily on that road tax.

Homburger: And that road tax did not apply in cities, did it?

Davis: That's right. In cities, there was simply an appropriation by the city government. But naturally, the property taxes, which were levied for many facilities in cities, were in a sense contributing to the road system.

Homburger: There was another agency, the toll bridge authority, which was perhaps the first incursion of the state into urban highways? Or was California always accepting some city streets into the state highway system?

Davis: There was county aid--I don't know exactly the date at which that began, but there was provision in some of the highway bills, and there still is, for use in urban areas. And furthermore, later part of the federal appropriations included road for urban areas, particularly when we began to get these great metropolitan areas.

Do you think I should say something about the national setup on roads in this?

Homburger: Yes. In this same period, in the late forties.

Roads and Urban Development

Davis: It's very interesting how the financing of transport systems evolved, and also what their impact was. As a matter of fact, the growth of suburbs was due to the mass transit trolley systems. The early trolley systems, called traction companies,

made their money by buying up land in the suburbs and then building a trolley extension to that suburb, and then selling the land. So really it was an investment problem on the part of the development of many parts of the transit systems.

When we got to big subways and so on, why then that was another story. Although the subways were also responsible, giving rapid transit to many of the suburban cities. And that's certainly visible in the way the New York area grew up.

Homburger: When you were living in Huntington Park, was that the heyday of this kind of urban development by help of the streetcar?

Davis: It was well underway. We had two services there in Huntington Park, which was a town between Los Angeles and Long Beach, and we were served by the city trolley cars, although the service wasn't all that fast, and by the Red Lines, which was operated by the Southern Pacific--the red cars of the Los Angeles area. And those red cars extended way out, some of them as far as San Bernardino, as well as serving the San Fernando Valley.

The development of better roads, of course, meant that many people, since they had now owned cars, would do some of the commuting, and so the SP red car system went out of business. But the Los Angeles city transit system is still operating and has made many new innovations.

In the ITTE development, of course, we were wondering almost from the beginning what we could do about transit and its operations. One of the reasons you came on board would be that at least one if not more members of the staff would give some attention to the transit area. So you had a hand in development.

Homburger: The Institute never did much work in railroad engineering, did it?

Davis: No.

Homburger: Why was that?

Davis: Because time had passed by. The railroads were not expanding. Very few line extensions were made, oh, I guess after the twenties. And so there was just no more way for young engineers to get a job with the railroads. When I graduated in 1928, one of my classmates went to work for the Southern Pacific, and most of his jobs were on special things that had to be repaired or develop a short line cut, and so on--tunnels. But the use of the rail system for ordinary use, that is, local use, started to decline by the twenties.

Homburger: Did the Southern Pacific, which ran the red cars and so on, also own a lot of excess real estate?

Davis: I don't know that they did. I think a lot of these towns in the Los Angeles area, southern California area, I'd better say, in San Fernando Valley and out toward San Bernardino--there are a number of cities out there--I think they were served because there would be a demand in large part. In the very early period, around the turn of the century or the 1890s, the streetcar or traction car was a new thing, and automobiles had not yet come into much usage. Besides, they were unreliable for the most part. So the field for commuting was for the transit system, the local transit system. And while they took advantage of advancing technology, of course, the automobile for many commuters provided a faster trip than transit did, because of the stops that were necessary on the transit cars.

Homburger: And, as we've seen in some of the early Hollywood movies, Los Angeles had a lot of boulevards in those days already, which were pretty fast.

Davis: Yes. When the automobile began to come in, not so much in the first decade, but after World War I, and more people began to have cars, there was a demand for better city roadways and these boulevards, which would be aimed at long distances like the one that ran from L.A. to Long Beach, or went out to the valley to the east and up into the San Fernando Valley. There was a strong interest and probably pressure in developing better roads than simply city streets. And I think one of the very early boulevard or expressway type of facilities was the one out of Los Angeles to Pasadena.

The idea of achieving higher speeds, of course, as you probably know better than I, is the control of access. That was a long time developing. I think it was the result of some of the engineers in New York City who developed the idea of controlled access by having parkways, so that the park would serve as a buffer zone between driveways of people coming into a street at all points. So the idea of controlled access was one of the early concepts that did a great deal and contributed to the parkway idea.

As you probably know, there sometimes was considerable controversy about putting in boulevards and so on that would cut off access of the adjacent property owner. Of course, that was solved in some cases by providing access roads parallel.

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One of the functions of a highway is to provide access to special kinds of developments, and one of the reasons that airfields were mentioned in the early legislation that started the institute and was amplified later was airport access from highways. Now it seems to be hard to even get a transit vehicle near the airport.

Homburger: What do you mean there?

Davis: Well, this argument down the Peninsula there, where some groups want the stop of BART a mile or two from the airport, so they can develop property out there, I guess, and others want it to come through the airport in a subway.

Homburger: Oh, I see. Of course, airports in the late forties, the period we've been talking about, were also much, much smaller and more intimate.

Davis: Yes. And in that connection, they developed a very serious limitation on account of the noise problem as to what they could do and where they could locate. So that was our colleague Horonjeff's field, and he, I think, was fully aware of the matter of access to the airport, and did some work in that field. They call it the groundside.

Homburger: In those days, it was of course propeller planes which were much noisier than our modern jets.

Davis: Yes.

Homburger: But even in those days, there were complaints from the neighbors?

Davis: I think so. Yes, propeller planes weren't exactly silent, you know, and if they had to fly low for a landing, why, they could also provide a notable irritation in the householders in that path.

VIII THE PROGRAMS OF THE INSTITUTE

[Interview 4: December 10, 1992]##

Davis: At this sitting, I would like to talk about our Institute programs. As a prefatory note, in the initial efforts to get our needed activities underway, Dean O'Brien and our faculty committee at the time, and the developing staff a little later, had discussed at various times and in various forms suggestions, lists, summaries of educational and research activities, which by mutual acceptance provided general guidelines for starting various areas of necessary effort.

The following summary in outline form identifies, in retrospect of course, the several programs on the Institute's agenda that were set in motion. The outline lists several programs by general area of activity. I have divided the areas of activity into education, research, and support activity.

Education

Davis: Under the area of education is the undergraduate instruction. There we proposed that attention be given to revised and new undergraduate courses to be offered in an undergraduate major in transportation engineering. I should point out that two courses, one in highway engineering and one in railroad engineering, had been offered by the Department of Civil Engineering in its transportation option for many years. But the idea here is to bring new personnel in, and a change in or updating of subject matter.

The second education item is an integrated graduate instruction program. Here, there would be a series of courses to make up an overall advanced program in transportation with some optional courses to be provided. This would be designed to provide for a degree at the master's or doctoral level. A student's graduate program would usually also involve an independent research project and the preparation of a thesis.

A third area under our education classification would be extension instruction. This would be a program conducted at various locations in the state under the general auspices of Statewide University Extension, for which we made arrangements with University Extension, but designed and offered under the direction of an ITTE staff member. Some of these offerings might sometimes be called, and have been called, "in-service training." Others, sometimes referred to as short courses, were centered on explanation and/or demonstrations of newly developing technologies and methods, or newly developed information regarding current practices. Still others were in the forms of conferences for interchange of information by senior employees of state and local agencies considering policy problems, considering current issues, considering organizational problems and methods, and others. This type of thing was augmented by major ITTE staff members or qualified invited guest speakers.

A fourth category under the educational programs was public information. This was not a program to simply influence people in a way which would be used by advertising agencies. This kind of program envisioned informational material prepared by publications or given by staff for informing editors of publications in the transport field, or informing the general public regarding new developments from research, or new information regarding currently important transportation issues.

Research

Davis: The second major area is research. Some research programs undertaken by the Institute were as large projects conducted by a group of pertinent staff members with assistants. Other projects were undertaken by individual staff members, with or without staff assistance. Such internally initiated research would generally be approved by the director or the executive committee or both. Other research activity might be initiated by a request, for example, of the state highway department. If a proposal of a project was to be approved, the executive committee would consider the resources available and staff capabilities was considered.

Some research might involve physical experimentation requiring laboratory facilities and equipment, or field studies which would require a headquarters for the operation of the field tests. Secondly, analytical activity requiring the assembly of data and/or other numerical information and

requiring the use of computer facilities. Third, a contemplative process by an individual using prior personally generated information, or assembled data from various sources, which would then lead to logical mentally composed conclusions and explanations or hypotheses.

Support Activities

Davis: A third category would be support activity. This would be to provide support for the above-mentioned programs of Institute educational and research activity. An organized group of support activities is mandatory for this. These activities include a working library to serve both educational and research needs, as well as containing technical books primarily; but such a library should also include pertinent technical reports on research, investigative actions, periodicals relating to important aspects of the transport field, and periodicals and reports of closely related affected areas of activity. In addition, the library should acquire and preserve archival material pertaining to staff research, Institute publications, and materials for use in education, such as slides for projection.

A second major support would be a publication capacity, which would require efforts of a staff member especially chosen for his ability in editorial work.

A third category would be laboratories, some specifically designed for instruction, and some, of course, for different kinds of research.

And a fourth support would be shops for maintenance and repair of research equipment, and for making certain kinds of research instruments and equipment.

Incidentally, while commenting on the subject of what the Institute's concept of its programs were, I recall that from time to time, we got inquiries asking what the Institute did. One was particularly interesting. Back in the 1950s, the publisher of some magazine that dealt with road-building equipment wrote us a letter suggesting that we might like to receive their publication for our library. They also requested the return of a questionnaire which at one point asked what our product was. I replied that our product was ideas and educated persons. We never received that magazine.

I here append a footnote to the development of our programs. I think we fully realized that the topics to be addressed in any program are not fixed. Factors that require change in the focus of attention may be: change in human needs, change in surrounding conditions, (for example, in transportation, land use, economics, social change, and so on), also change in technologies available, or change in the abilities of personnel, and others. Changes such as these may affect both the priorities of a research program and the subject matter to be treated in both educational and research programs.

I opine that the need to adjust to changing conditions was very neatly said by poet James Russell Lowell more than a century ago, when he commented on a then "present crisis." He said, "New occasions bring new duties. Time makes ancient good uncouth. They must upward still and onward who would keep abreast of truth."

Homburger: This then is an introduction to the specific program components that we're going to talk about in greater length. Is that correct?

Davis: Yes, that's correct. And I think we should now add some pertinent details as to the individual kinds of research programs.

Homburger: Right.

[Interview 5: March 30, 1993]##

Multidisciplinary Aspects in the Educational and Professional Phases of Engineering

Homburger: Harmer, it's been three months since we last talked, so let's pick up about where we took off, and I think you have some things all ready to go.

Davis: Yes, Wolf. So far in the recital of my background and my multi-satisfying career, at least to me, at the University of California, I have mainly followed a chronological pattern of discourse, which, of course, is the customary basis for many historical recitals.

But here I should like to insert some comments of a topical nature. At this point, I propose to make some observations on the importance of recognizing the

multidisciplinary aspects in both educational and professional phases of engineering. In the process of planning and design of a number of types of engineering systems (notably including transportation systems), consideration must be given to three facets of systems operation.

First is how well and at what cost the system serves its users, who are the direct beneficiaries. Secondly, how the system and its output affects the surrounding environments, both living and physical. And third, how the surrounding environment affects the operation, safety and productivity of the system.

The physical design of the system parts and its spatial layout are mainly a responsibility of the engineers involved. The impact of system operation on its surroundings depends on, first, the nature of the situation, that is, the topography in which the systems operate, and the usage of the land surrounding it, and some others, which we can talk about.

The nature of the surroundings reciprocally can affect the cost and the performance of the system, and should be foreseen as much as possible. The demand that will be placed on the system, essential for the initial design, will be some function of the nature and distribution of the land uses in the region to be served, and the level of demand and its nature will change as land uses change. Such external factors and changes therein will require changes in the nature of the operation of the system, and possibly redesign of parts thereof.

Because of the various kinds of information required for an effective overall design, there may be required some data and concepts not necessarily of an engineering nature: an input of information of an economic nature, for example, land use factors, and even sociologic nature may be required. The input of information of these types, and there are more, has increasingly been taken into account through the especially informed input from persons whose professional background is other than engineering.

In other words, a multi-professional input of knowledge and judgment is important to the provision of effective systems that serve the public on a large scale. In the past, unfortunately, members of disciplines that make up the faculties of the university have not always been accustomed to intercommunicate in reality.

It seemed to us in the early ages of the Institute of Transportation and Traffic Engineering, now the Institute of

Transportation Studies, that if our students were to be adequately educated for careers in fields that would increasingly involve the planning and design process for complex systems, they would have a need in their educational process to begin to feel at home in meetings of knowledgeable persons in various disciplines, and they should be able to communicate information and ideas to persons having backgrounds other than their own.

At the time the Institute was beginning its development in 1948 to 1950 or a little later, it was difficult to attract the interest of persons in other departments on campus to giving either teaching or research time to an institute which to them was just a new foreign department conducted by engineers. Fortunately, the idea of dual appointments was possible for us with an academic appointment in an allied academic department, and with a research appointment in the Institute or a laboratory.

Thus we were able to attract competent persons in several different fields. For example, at Berkeley, appointments were arranged for a person with an excellent background in public finance, in other words, economics, a capable mathematician interested in devising mathematical models to describe various kinds of traffic movement, and other such areas. At the UCLA section of the Institute, where considerable attention was given to human factors in transport, a psychologist on the staff performed notable work on driver behavior.

On the instruction side of the operation, a person such as these from other disciplines who had joined up with us would give a seminar concerned, for example, with traffic problems, so that students could understand the language and the general thinking about problems requiring input by specialists in other disciplines. Thus it was possible for transportation engineering students to develop some confidence in dealing with persons and problems other than those involved only in engineering.

Since that time, we find that the idea of multidisciplinary studies and multidisciplinary research has found favor in a number of departments of the university, and also in an important national research agency, the Transportation Research Board of the National Research Council, where reports on multidisciplinary studies are beginning to appear. We, who were privileged to have a part in the early development of the Institute here, can be pleased that we were able to have contributed to a relatively modern phase and expanded scope of the process of planning and design of complex

systems such as is required for the provision and operation of transport systems.

Homburger: Society has expected a lot from the transportation, call him or her engineer or professional, beyond engineering. For instance, the environmental impact process has required a lot of new disciplines. Do you have some feel for where the transportation professionals are going to go in the next decade in terms of the skills that they have to have?

Davis: Yes, I think that's rapidly becoming realized that that also is important. With respect to the educational side, I felt it was desirable to have the young engineers, who might be thinking only in terms of engineering, be perfectly at ease and discuss with other professionals the problems encountered in any particular development.

Homburger: It seems to become more and more difficult to educate a transportation professional in all of these new disciplines as well as in the basics of engineering, even in a five-year program that might lead to a master's degree. Do you have some views on that?

Davis: I don't view that as such a severe problem. I felt that what we've done in the Institute is a beginning in that direction. I think I mentioned in that little discourse that some of our staff members in the Institute, a number of whom had lectureships also and therefore did teaching, would begin to put a flavor of the need to recognize that some of these other considerations must be taken into account in the final design, and therefore, call it a team effort or call it multidisciplinary or whatever. It to some extent--perhaps not far enough now--becomes a part of the teaching program.

Institute Components

Homburger: We were going to also spend a little time to talk specifically about each of the major components of the Institute, such as the library, as they evolved after the beginning.

Davis: I think we mentioned, perhaps in a vague fashion, that now a series of topical comments would help round out this. That's why this is one that I picked, because I think it was a rather unique development as compared with many educational programs in transportation. And I think I also mentioned the idea of an advisory committee and what kinds of professions or disciplines really are essential if you have an advisory committee to a

transportation-type agency, for these same reasons I've mentioned in connection with the multidisciplinary business. So that's one.

This matter of the nature of the components of the institute should receive a little attention.

Homburger: We have identified at least six areas of the Institute that each deserve a special little conversation. I'm just going to list them, and then we'll talk about at least one of them. The six are the advisory committees that guided the Institute and to some extent still do; the laboratories; the PATH program, that stood initially for Program for Advanced Technology for the Highway--I believe it now stands for something else, same initials--which grew out of the laboratories; the library; computer laboratory; and the extension program.

ITTE Extension

Davis: Suppose as the next topic, we talk about Extension. In the first place, the University of California is a land-grant college. In the early days when it was desirable to improve the agricultural productivity of our country, the federal government established this program of having institutions for teaching and research as recipients of grants. These grants came from some of the early grants of land which were made in order to stimulate development of the Middle West and West. The money received from those grants was used to provide the funds for this educational research aspect.

When our Institute was started, a number of the legislators were interested in that, not in a political way, but in what might be accomplished for the state through such an instrument as, in this case, transportation. A long-time precedent at the University of California, of course, has been the Agricultural Extension program, developed along with the College of Agriculture in which, through research, there would be developed new plant types, and also the way of meeting some of the problems that were encountered in the varied soil and climatic conditions up and down this state.

In order to provide for the transmission of information, there was established, at least at Berkeley, an Agricultural Extension Service, which comprised at least two important elements. One was the preparation of reports from practical research, and the other was called the Farm Advisor type of activity, in which an appointed person in the School of

Agriculture had an extension title, and made trips up and down the state to communicate, to hear about problems, some of which could then be taken over by the research part of the activity.

In all, as we look at it, this did two things: one, it greatly extended the power of agriculture--I don't mean the political power, I mean the extent as an industry, its scope and power; the legislature was to provide a very strong support, especially when it came to budget time, by the population up and down the state who had seen what was being done.

I may have spoken of this during the early part of our conversation on the Institute development: in the immediate postwar years it was obvious that an enormous rehabilitation of the transportation facilities of this state was needed, because many of them that were not related to supporting the war effort were just left there. They needed repair. This had to do with highways and airports, because we had begun to have a considerable number of airports constructed, devoted to flying by private persons, not just airlines.

There happened to be in the legislature at that time a statesman-like member of the senate, George Hatfield from Merced. While the bill, I think, was put in by someone else in the legislature, he had a great interest in it, and I think he was one of the movers who saw that this went through. His interest, being from Merced County, was to try to see that a thing similar to educating or getting information to the agricultural people would happen in transportation.

He asked me to sit down for a conversation shortly after our Institute was begun, and told of that kind of problem, and hoped that maybe some kind of program could be devised to do this. Since the College of Agriculture had had lots of experience in a practical extension program, which not only gave courses but also had a continuing agenda, I asked one of the professors that I knew in the College of Agriculture to give me some feeling for what an extension program of that kind would entail.

It was for that reason, and the obvious need for such a thing, that I spent quite a bit of time thinking about how one would go about that in transportation. Of course, one need was a person or personnel to conduct it, and the other was to have a thought-out agenda so that you could communicate to anybody we should employ to run this thing the type and the objectivers of the program.

It so happened that, in my years in looking at materials, particularly for bridges and highways and so on, I had become

acquainted with a man at Oregon State University. (We always called him Bob Glenn; his name was Burdette, but he didn't like the name Burdette that his folks gave him, so he always told everybody he was Bob Glenn.) This was right up his alley, because he was a man who was motivated by service to somebody. From what I heard from some of his students, he did a great job of teaching and communicating in the course in highway and transportation there at Oregon State.

But financing was getting pretty low up there at Oregon State, and the offer to come here and do something in extension--I gave him some of the reasons we thought it was important--attracted him. So he organized, and until his retirement, he conducted this, although off and on when needed there would be help given to him.

Another thing that he did, which was a great help, in addition to devising needed short courses in the transportation field, of which there are many subtopics, was to, whenever possible, take trips up and down the state, not all at once, but from time to time, when maybe a short course was given, to talk with the county engineers or city engineers and find out what their problems were and where they were stymied and so on. And of course, this could also play back into the topics for these extension courses, as well as his use in conveying to these engineers in local governmental agencies some information that would be helpful to them.

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Davis: So this matter of conveying information on a particular topic was one phase. As I mentioned, in addition to a one-to-one conversation with a person, and Bob Glenn was the man who was knowledgeable enough to do that, we also had the short courses in special topics. Particularly in the area of traffic engineering, there were many new developments that were coming along nation-wide. The short courses in traffic engineering were very popular, especially in those areas where there was lots of traffic because of the size of the city or county or whatever. So this matter of directly communicating on a topical subject.

Another aspect of the communication program was, at least once a year, a statewide conference and program in which we brought in people from anywhere in the United States to look at problems and issues of interest to those concerned with transportation in this state. I think that did a lot of good too, because certainly when I talked to county engineers or city engineers here and there, they always mentioned how much they got out of these big annual conferences.

So this kind of activity seems to have been a good thing to extend the function of the university to the practitioners in a particular profession.

Homburger: I believe that over the years, a very special relationship developed between both Bob Glenn as an individual and the Institute generally, and the county engineers, the County Supervisors Association, and the League of California Cities. Is that right?

Davis: Yes, because both the county engineers and the city engineers naturally would have their annual business meetings, in connection with which they'd have a program. And so they often sought having someone from our staff talk to them, which made up part of their program. This annual conference-type program had the service of an advisory committee, most of whose members were in the city or county transportation activity. So that meant that many topics were brought up that would be of use for design of the short course program, as well as what should go on the annual program.

The county engineers especially were active in bringing suggestions to Bob Glenn. One of the difficult things in a big program of putting on meetings and conferences is what you're going to talk about, what topic is going to be of use, and so on. The engineers in local government were ready and willing to spend time in talking about where the needs were for people at that level and in the engineering activity.

In addition to that, the then-called State Division of Highways felt that many of the younger people and some of their older people on their staff needed access to new information. So, in addition to bringing new ideas and information to transportation engineers in local activity, much of our field activity was to help make the technical staff of the Division of Highways knowledgeable of what was going on in the way of new development.

In return, there were some very excellent, knowledgeable professionals in the Division of Highways, and on some of these short courses that we gave, the Division of Highways would lend us some of their people to serve as instructors, which again did two things: one, transmit the information, and secondly, improve what sometimes were difficult relations between local government and the state operation. So this, while it was a secondary offplay, nevertheless did something I think to improve the overall knowhow of transport knowledge of the professionals in this state.

Homburger: Yesterday, coming back from central California, I had lunch at Tres Pinos, which made me start thinking about the San Benito County Engineer Ed Hanna, and something called bedroll conferences. Were you ever at one of these?

Davis: No, I never got to their bedroll conferences.

Homburger: Were those just social occasions, or were they also useful in a professional way?

Davis: Well, when the County Engineers Association, which had been very helpful as a group to our extension program, put on their annual meetings, it's both. They have social events, things like tennis or golf and so on, and they plan the whole program which will include these as well as the sessions which would be concerned with technical issues. So you have both information and entertainment of one kind or another.

Homburger: I seem to remember that Bob Glenn and possibly one or two of his successors did participate in these conferences, including, I presume, sleeping outdoors, which is how I interpret "bedroll conference." That must have cemented the relationship and for the rest of the year made a very useful link.

Davis: Of course, there was a lot of opportunity to do that, where there were conferences which rotated around the state. If they were up in one of the rural areas or in the Mother Lode country or something like that, that could give it a semi-camping aspect.

Homburger: Also, somewhat related to that, it seems to me that some of the most supportive, knowledgeable, and statesman-like leaders in the engineering profession were actually the county engineers of fairly rural counties. Isn't that true?

Davis: Well, I'd add to that. Not only in the technical arm of the local governments and so on, but I noticed that usually the senators or assemblymen from the rural regions really had a better overall feel for the state problems than did those from the cities. George Hatfield was one of them, who was looking at the whole picture, in addition to the fact that he was a consummate politician in the way of getting things done. I thought this said something about the people from the more rural parts of the state.

Homburger: I was trying to remember the names of some of those engineers, but my memory fails. I think there were the engineers from Monterey County and Humboldt County, for example. Several were part of the advisory committee and otherwise active.

Davis: Yes. I don't think I could recall their names right offhand, but certainly, Ed Hanna from San Benito County was one of those who was able to recognize and sort of act as a father confessor to some of the younger ones on many different kinds of problems. In addition, he had a wonderful sense of humor.

Homburger: Is there anything else about the extension program, perhaps in later years, to round this out?

Davis: Inasmuch as the program in transportation was carried out by the Institute, it required sometimes some difficult inter-understandings with the statewide extension division. But fortunately, I think wherever there were differences that ought to be talked out, we arrived at rather good solutions to both sides, the University Extension and the specialized extension group. I could well understand their possible alarm of, here are some upstarts coming along with their own ideas on an extension program, and they hadn't initially been consulted. I and Bob Glenn made a special effort to discuss these things with the Director of Statewide Extension, and explain why we do things, and so on.

Homburger: I believe later on, when the university decentralized and gave a lot of the decision-making powers to the individual campuses, that the problem cropped up again whenever ITTE or ITS wanted to give courses in what some other campus considered to be its territory. These issues had to be revisited before they finally welcomed the extension program back in.

Davis: Well, so far as I know, although I've been away from it some years, there were potentials for difficulty. But I believe that we always were able to talk things out, and they saw what we had to do. If we at the same time followed certain overall university rules, or policies of Statewide Extension or of the extension efforts of a particular campus, they seemed to be resolved. Now, I don't know how it's been recently.

Homburger: It's working fairly well. It's just that once every five years or so, somebody new is on the job, and has to be reminded of what the situation has been.[1]

Before we leave extension entirely, one other look back might be interesting. In the annual conferences, there was often a keynote speaker brought in from some other part of the country, possibly even from a foreign country. I can think of the one that perhaps left the most vivid impression being

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[1]Some material is moved from this point to page 79 to provide a better sequence.

Wilfred Owen. Do you have any reminiscences about some of those people who came to give that special something to these conferences?

Davis: Yes, I think even I had quite a part in that, because I felt it was extremely important that those who were concerned with transport in this state can learn from some of the things or benefit from working with some of the ideas of people elsewhere. They needn't necessarily have been on the technical side of transport, but it's important, I think, for our own people to know something about some of the economic issues, about some of the political problems, about what may develop nationwide which will affect California. So we also had people from the then-Bureau of Public Roads, now called Federal Highway Administration.

So I think we were able, through these various efforts, to give transportation people in this state a fairly rich dish of information on many aspects of the transport problem.

Homburger: Wilfred Owen used to write some of his speeches in doggerel rhyme, didn't he?

Davis: Yes. He had a great intellect. Probably some of the best books or papers on the economic side, as well as on general transportation policy, have been written by Will Owen.

Homburger: Do you recall any others that came out here to give similar keynote speeches?

Davis: Well, I don't recall them offhand. But we did have people from elsewhere. Well, does that cover fairly well what started out to be an extension discourse?

Homburger: I think it does.[1]

Multi-campus Organization

Davis: The multi-campus branch system of the original ITTE is no longer; the Institutes on the various campuses are independent and collaborate in transportation activities.

At the time the Institute was started at UCLA, Dean Boelter was very favorable to the idea of the Institute, and when he went to UCLA to make it a substantial engineering

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[1]Material moved from page 78 appears here.

school, he was also, because his interests were on the mechanical engineering side to begin with. A lot of the things that would affect the mechanical engineer--different kinds of machinery, different systems of conveyance of, even, information, the old electrical activity--were really a part of the College of Mechanics in the early days.

At any rate, he felt that in addition to the technological stuff, some attention to human behavior, both human behavior on the operation side and also the effect of various things on people, must be taken into account. For that reason, and with the blessing of Dean O'Brien at Berkeley, we agreed to have--we hesitated to call it a branch--a segment of the institute at UCLA. A major item in the overall topic functions of the Institute was the human factors. That's why a lot of their work was on highway safety, both in respect to the driver or the human, and with the interaction of the driver as it affected, say, traffic.

There are some subjects, like transport, which are of great interest to a lot of people, including a lot of campuses. You'll notice that in the United States, the idea of transportation centers or institutes has grown.

Research Program

Davis: Another fairly broad topic, which is certainly a part of the Institute activity, is the research program. That's all over the place. At the very beginning, there was the question of what types of research need attention, and what kind of equipment or laboratories do these things need. With the Field Station, of course, there was the opportunity to develop the outdoor field research as well as the physical laboratory kind of thing; for example, Moyer's work on roads and road roughness. And, of course, a lot of the traffic studies needed field work. So one might think of the research program as involving laboratory-type research; others have to be think pieces and development of concepts, drawn from many sources to make a composite answer. And, of course, field studies.

So it got quite involved with these three general aspects [research, education, support services], what we were able to do. And they all intermingled, too. For example, it was important for the library to have the references needed for the researchers on many different topics, and the library, of course, plays a function in education of students.

The Library

Davis: Apropos the library: at the very beginning, even before we had a staff, Dean O'Brien put the pressure on me to forget other things I was doing and help put the Institute on the road, there were three things, as I saw it: one, staff--get the staff to cover the areas that would be useful--the second was the research, which meant laboratories, which meant money for equipment, the third was to support studies of one kind or another, as well as to provide a broader base for education of students, and that actually was the library. We had talked about this long before, because I was on a little committee that the Dean had. Those things don't take form overnight.

I think the second appointee, Beverly Hickok, became the librarian even before we started other programs, because you need naturally a core of books and reports and so on to start business, if you're going to teach classes, and if you're going to have researchers who need access. There was no branch library, at least on the Berkeley campus, which specialized in transportation, so that was a natural.

In the beginning, we needed housing. We had one of the old temporary buildings down on the slough opposite the big library. Fortunately, Beverly Hickok had a great interest in what the needs of a library serving the transportation organization should be. So whenever possible, others as well as I tried to send her suggestions--because we were constantly looking at transport development--especially on reports. And gradually, various kinds of technical books were also brought in, some quite standard that one would find used by any transportation technician.

And then there's also the problem that has to be met of housing a library. It seems that no matter how extensive a first try at the library is, it always outgrows it. I think even in the library as it stands now, some of the things have to be stored elsewhere.

Homburger: Up in an attic.

Davis: Yes. But one of the essential things is a librarian who does have an interest in doing something in this field. One of them, in addition to making available and keeping track of the stock in the library, is to keep the clientele--that's the faculty and the research staff--informed of what's there, what's been accumulated. And I think Bev Hickok did a marvelous job of keeping all of us informed on new acquisitions.

Homburger: Did you devote a substantial part of the institute's budget to help acquire a lot of things?

Davis: We had a fairly substantial support for the library, yes. Those things don't come cheap.

Homburger: And as it grew, the staff of the library also had to grow.

Davis: Yes.

IX INSTITUTE PROGRAMS - MULTIDISCIPLINARY RESEARCH

[Interview 6: April 21, 1993]##[1]

Davis: In connection with comments I previously made about multi-disciplinary research, I got to thinking about a notable instance of that approach to some kinds of problems. This has to do with a problem and a piece of research that involved two UC faculty members--Professor Howard D. Eberhart of the Civil Engineering Department at Berkeley, and Professor Vern Inman, a surgeon at the UC Medical School in San Francisco.[2]

Homburger: In the Institute, there was also multidisciplinary research carried on that involved at least some aspects of this--the crash research at UCLA that must have involved some medical people who designed the dummies that were used.

Davis: That's true. I didn't mention it in the earlier part that we recorded. We did mention, however, that in staffing the institute, we felt it was important to provide a feeling of our graduate students for the things that other disciplines could supply, in the way of ideas, information, data and so on, and that our students should be accustomed to talking with people and working with people of other disciplines.

In order to provide an outlook in things that were not ordinarily included in advanced engineering studies, you will recall that we obtained the services of Richard Zettel at the University of Washington, who had his major in public finance, which was important, of course, directly to transportation studies. Of course, the development of mathematical models was very important, and for that reason, we got Gordon Newell, who had been at Brown University, to transfer to our Institute. And we also had a young man who was able in statistics. These disciplines were very important in developing mathematical

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[1]As noted above, much of Tape 9 material has been placed in earlier sections of this history.

[2]See pages 19-21.

models of traffic movement and other engineering analysis that would make use of mathematical models.

At Los Angeles--I think I mentioned this before--Dean [L.K.M.] Boelter, who was very much interested in human factors that are related to the development and use of many different technological devices, was interested in doing something toward the transportation activity. And so there, we had a person who had been in the traffic side, looking at accidents at the National Safety Council. And also we had someone who was a psychologist and also a physiologist as part-time staff members, which were of great use in some of the studies of driver behavior, including, for example, the development of certain kinds of road signs, the reaction to which affected driver behavior.

Homburger: The first of those--was that Derwyn Severy? The one that came from the National Safety Council?

Davis: No; that was our assistant director there, Harry Mathewson.

Homburger: And the other was Slade Hulbert.

Davis: And Slade Hulbert. And there were a couple more, I think, that were active in some of that work.

Homburger: Derwyn Severy did the crash studies, I believe. He ran cars into each other on an abandoned airfield. Because I'm still thinking of Howard Eberhart, there was, in fact, some input from the medical sciences in the UCLA work.

Davis: Yes, but I think it's an example of those in engineering, and particularly those in transportation engineering, early, saw the value of developing interaction between engineers and people with other disciplines.

Homburger: After a while, there was also a much closer link with city planning.

Davis: Yes. I think I mentioned something about that, when I talked about my first entering Berkeley in architecture, and that I had become acquainted individually with a number of people in architecture, and then its later development in city and regional planning. So I often had discussions with people in the city planning department, and conversely, Melvin Webber and I discussed many of the kinds of problems that were involved--for example, studying the impact of the BART system on this region, and also how the various techniques in land use planning were important in the education of engineers. That doesn't mean they would become expert land use planners. But

in the Institute, we felt that our products should be fully aware and not opposed to ideas that came from another discipline like city and regional planning.

X SOME CLOSING COMMENTS

[Interview 7: May 30, 1997]##[1]

[NOTE: Phyllis (Mrs. Harmer E.) Davis participated in this interview.]

Membership in the Bohemian Club

Homburger: Harmer, you were going to say something about the Bohemian Club and your membership in it?

Davis: Well, in addition to the San Francisco club, they had a summer gathering. Usually, there were various kinds of funny dances. Since I knew something about that, I taught dances there in the Bohemian Club. When I grew old enough, I resigned from that and the question was, Well what now? Well, I have written the Bohemian Club, telling them that I want to resign because I no longer teach the dances. I haven't had the reply, yet.

P.Davis: That's a little bit different than what you conveyed to me at one time.

Davis: Well, tell them what I conveyed.

P.Davis: Well, in the first place, the Grove is a beautiful grove with redwood trees, and there are different little individual camps around. Once a year, they put on a program that is put on just for the members of the club. Actually, it ends up being in published book form. Harmer said that when he joined, everybody had to carry some kind of--I forget how you labelled it. Anyway, everybody had to do something, and he said he could play the clarinet, that he had in college years. They said, no, that they had enough clarinet players. Anyway, the music is spectacular. They have the cream of the crop in everything. So he said that he could do dancing. For their play, they wanted someone in charge of the dance, so they put

[1]Only a small part of this interview has been used here.

Harmer in charge of teaching people the different dances. So he did that sort of Scottish--you know, the--

Homburger: Highland Reel?

P.Davis: No, the one where they get down and they kick. I can't think of the name of it.

Davis: I can't either.

P.Davis: Well, whatever play they had, he was in charge of the dancing.

Homburger: And for how many years did that go on?

P.Davis: Oh, I don't know. I have no idea how many years.

Davis: I don't even remember that.

P.Davis: Then, once a year, they invite family members and friends up, and they have a great big dinner, and they put on a program for them, but it's not the one that they put on for themselves.

Davis: Anyway, one of the members of the club, who always did something for the club, had this made.

P.Davis: For everyone in his tent.

Homburger: Is that what's called a bolo? It's beautiful.

P.Davis: That owl is a symbol of the Bohemian Club.

Homburger: Yes, I'm trying to describe it for the tape. It's like a string tie with a beautiful metal trapezoid-shaped--what would you call it--a plaque, perhaps, showing an owl and the symbol of the Bohemian Club: very attractive.

P.Davis: That's the sign that they use for square dancing.

Homburger: Well, thank you for telling me about that.

Davis: Aw, 'taint nothin'. [laughs] You can interpret "'taint nothin'?".

Homburger: Yes, yes--double negative.

Summarizing

Homburger: Now, how about some closing comments on this whole history?

Davis: On this history?

Homburger: Yes, do you have any summary of your career and how you feel about it now?

Davis: Well, I don't feel a damn thing about it. Does that answer your question? [laughs]

P.Davis: No, no. You told me once that it was just like being on a vacation all the time, because you loved your work so. That's what you told me.

Davis: There. There you've got it. [laughs]

XI INTERVIEWS WITH RICHARD M. ZETTEL

BIOGRAPHICAL INFORMATION

Date of Birth: March 7, 1915
Place of Birth: Montana

Education: Onalaska Union High School, graduated 1933
University of Washington, B.A. in Economics and Public Finance, 1937; M.A. in Economics and Public Finance, 1942

Military Service: U. S. Navy, Lt. (j.g.), Naval Intelligence, 1943-46

Employment: 1937-40 Washington State Tax Commission:
1937-38 Director, Research and Statistics
1938-40 Special Tax Auditor
1939-41 University of Washington: Teaching Fellow
1941-42 U. S. Dept. of Labor, Wage-Hour Division: Investigator
1942-43 Board of Investigation & Research: Highway Economist
1946-47 California Legislature Joint Committee on Highways: Tax Analyst
1947-51 Pacific Gas & Electric Co.: Tax Analyst
1951-80 University of California, Berkeley, Institute of Transportation and Traffic Engineering [Institute of Transportation Studies]: Research Economist; and Department of Civil Engineering: Lecturer

Temporary Assignments:

1948-51 (on leave from P.G.& E.) California Senate Interim Committee on Transportation & Taxation: Tax Economist
1952-53 (on leave from ITTE) California Senate Fact-Finding Committee on Transportation & Public Utilities: Staff Director; 1957-61 (on partial leave from ITTE): Consultant
1954-55 (on leave from ITTE) President's Commission on Intergovernmental Relations: Associate Director of Research--Public Finance Studies
1964-69 (on leave from ITTE) Bay Area Transportation Studies Commission: Director

Affiliations: Highway Research Board, National Research Council: Member, Committee on Taxation, Finance and Pricing
California State Chamber of Commerce: Member, Statewide Committee on Highways
Bay Area Council: Member Board of Governors; Member, Committee on Transportation

Honors: Tau Beta Pi
Tau Kappa Alpha (National Forensic Society)
Beta Gamma Sigma (National Commerce Society)

[Interview 1: April 6, 1993]##[1]
[Edited and Rewritten by Richard Zettel in June 1993.]

Background - 1915-1945

Homburger: Dick, I'm very happy to have the chance to do this interview with you. I'd like to start by having you give us a little bit of personal background and especially how you got involved in the transportation business. Why don't you start by telling us about where and when you were born?

Zettel: That goes back a long ways, Wolf. I was born in Montana in 1915. We migrated to Washington in 1923, and ended up in Onalaska [Lewis County], a small company-owned lumber town. I graduated from High School in 1933, after which I worked my way through the University of Washington as a janitor supported by the National Youth Authority, a job I held for four years. For three of my four undergraduate years I was also employed as a teaching fellow, handling "sections" of large lecture classes in Accounting and Economic Theory and Practice.

At first I specialized in economic theory, but later drifted into public finance under Professor James K. Hall, a recognized authority in the field. On graduation with a B. A. I was recommended for a position with the Washington State Tax Commission, where I worked for two or three years, first as a researcher, but later as a special auditor in sales tax enforcement.

After a U. S. civil service examination or two in economics, I was employed in the new Wage and Hour Division of the U. S. Department of Labor. I worked as an investigator in

[1]This symbol indicates the start of a new tape or tape segment. For guide on tapes, see page 113.

enforcement of minimum wage and maximum hours laws, first in the garment industry in Los Angeles and later in the logging industry in the Northwest. Sometime at intervals between jobs and otherwise, I managed to pick up an M. A. degree from the University of Washington, again under Professor Hall.

While delivering a report to the Labor Department in New York on wage and hour conditions in the Western States, I was interviewed for a position in the relatively new U. S. Transportation Board (of 1940) that was emphasizing studies of regulation, taxation, and possible subsidies of rail and highway carriers. This was my first exposure to the field of transport. My immediate supervisor at the Transportation Board's tax studies unit was Ronald B. Welch, who was later to become Director of Research and Statistics for California's Board of Equalization.

After I had left the Board for a tour in the Navy during World War II, Welch was instrumental in bringing me to California. It was then that my earlier experience in highway transport began to pay off.

The Collier Committee - 1945-1947

Zettel: As it turned out, my first postwar employment was with the California Legislature's Joint Interim Committee on Highways, Streets, and Bridges, later called the "Collier Committee" after its new chairman Senator Randolph Collier of Siskiyou County in Northern California. I turn my attention now to my experiences with the Committee and the highway legislation that resulted from its work.

The Collier Committee was charged with the development of a postwar highway program to finance deficiencies that had accumulated during World War II and to meet the needs of the continuing rapid growth of California. Senator Collier, who was in the Senate because of his earlier interest in transportation, attacked the problem with a vengeance. (He had once threatened to lead his area in a secession from California either to form a new State of Jefferson or to join the State of Oregon, in either case to improve roads and highways in his part of the country.) Collier also had by this time developed an abiding interest in freeway development as the ultimate solution to traffic problems, because he had a strong and continuing background in real estate matters.

Collier immediately employed Francis J. Carr, a former attorney of the California Department of Public Works and a native of the adjacent county of Shasta, as Executive Officer of the Committee. With little coaxing, together they enticed Senator George Hatfield, a retired "gentleman farmer" from Merced and a brilliant attorney, who originally practiced in water law and other affairs of state, to be the Committee's principal political strategist.

It was indeed Senator Collier who "carried the ball" on presentation and passage of the Collier-Burns Highway Act of 1947. But it was Senator Hatfield, in my judgment, who called the plays in the political arena. If Collier was the quarter back, Hatfield was the coach who designed the game plan.

Early on, Hatfield recognized that the Committee needed to conduct its own studies and to develop the support for a highway program independent of the Department of Public Works and its Division of Highways. Senator Collier and Francis Carr readily acknowledged the need for such action and sought advice on how to proceed. A close acquaintance of theirs, Ed Moore, executive officer of the California State Automobile Association, suggested that they start by reading a book, American Highway Policy, published by the Brookings Institution of Washington, DC, and authored by Charles L. Dearing and Wilfred Owen.

Being direct-action characters, Collier and Carr did Moore one better; they flew to Washington to interview Harold G. Moulton, the President of Brookings. They persuaded him to lend Dearing (much to Dearing's surprise) to the Committee to help it get started on its program.

After a "quick study" of the situation, Dearing made some landmark recommendations. Among other things in his review of transport administration, he made a trip around the state in company with Senator Hatfield. They visited state highway districts and evaluated their competence. They also surveyed county road management, where they found an abysmal situation, possibly involving the waste of millions of dollars of state grants, but accomplishing very little by way of road improvement.

This led to a visit to the engineering department of the University of California to inquire about education in highway engineering and administration. And thus were planted with President Robert Sproul and Dean Morrough P. O'Brien the seeds of what was later to become the Institute of Transportation and Traffic Engineering (ITTE).

To enhance possibilities of success, Dearing recommended that the Committee hold public hearings throughout the state to gather information, and also to engender political support for the program it was developing. He also saw the need for the Committee's own staff studies independent of reports of state and local officials. The first major undertaking was to be an analysis by the recently formed Automotive Safety Foundation (ASF), headed by G. Donald Kennedy, former Highway Commissioner of the State of Michigan. ASF was gearing up to do studies of state highway deficiencies and needs for the postwar period.

The engineering studies, Dearing suggested, should be buttressed by economic analyses and fiscal studies from which to develop a legislative program for 1947. Bertram Lindman of Washington State was selected to do the economic study. On recommendation of the State Board of Equalization, I was employed to do the financial analyses for the Committee, beginning with a full review of the history of state financing of highways, roads, and streets in California. This task worked nicely into a 50-year study from 1896 when the highway system was established to 1946 when I was writing. Luckily for me this turned out to be a "best seller" for legislators and others interested in the California highway situation. Undeservedly overblown though it was, it tended to secure my reputation as an expert on highway matters in California.

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While the staff work was going on, the Committee held some 103 hearings on highway transport needs and policies throughout the state from Los Angeles to Yreka and Modoc, from San Francisco to Sonora and Brawley. With its staff reports and hearing transcripts in hand, it was prepared to develop its recommendations for the 1947 session of the California legislature. And Senator Collier not only became a leader in highway matters in California but established a nationwide reputation in the transportation field.

After I finished my staff report, Francis Carr persuaded me to stay on with the Committee to assist in preparation of its report to the Legislature and in drafting bills to implement the recommendations. My experience with the law, both in the Washington Tax Commission and the U. S. Department of Labor, came in useful. We soon prepared the report and legislation and were ready for 1947.

But Hatfield had another ace up his sleeve. At that time, the Legislature was required to meet biennially for 30 days in Regular Session, then recess for 30 days in order to confer with constituents at home, after which they would return to

pass bills. Hatfield had seen that the required recess was nothing but a waste of time. He had always kept Governor Earl Warren fully informed as to the Committee's progress. He took it upon himself to persuade the Governor to call a Special Session on the highway program to run concurrently with the Regular Session. The "Red Session" (called "red" because of the color of ink with which its proceedings were printed) would not be subject to the recess requirement.

It was Hatfield's hope that the Highway Act of 1947 might be enacted and signed by early February. But this dream was soon shattered. The Special Session ran until late July and was still meeting with the two houses at full loggerheads for some time after the Black (i.e., Regular) Session had adjourned sine die. A brief rundown on the gridlock that took place follows.

The proposed highway legislation was approved by the Senate Transportation Committee on January 28, 1946 and by the full Senate a day or two later with five dissensions out of forty votes. When it arrived in the Assembly, it ran into a stone wall. All forward motion was stopped until mid-summer.

It should be noted in all fairness that the proposed statute was not a policy bill. It was a revenue and fund distribution bill--some might say a "tax and spend bill."

At the time, I thought that the opposition based its case solely on the amount and nature of the tax increases proposed. It seemed to emanate solely from the oil industry, whose major spokesman appeared to be John Pearce, an economist with the Western Oil and Gas Association, and from trucking interests of both the for-hire and proprietary variety (perhaps aided by the widely known Artie Samish who was thought to represent the Greyhound Corporation as well as the liquor industry).

On reflection, I now think I may have been partially mistaken. There may have been a hidden agenda among the many of the urban Assembly members who had been (or thought they would be) "burned" by California's developing and burgeoning freeway program which would be accelerated by the legislation.

This would help explain the bitter dichotomy between the Senate and the Assembly; for the former was largely rural-oriented and the latter was basically an urban house, in which many of the members had become "gun shy". This attitude, even though tacit, would certainly have been nurtured and exploited by the outspoken opponents of the program.

Proponents of the legislation did their best to overcome the opposition. The Governor and his cabinet strongly supported the program, as did the County Supervisors Association and the League of California Cities. Also strongly in support were the City of Los Angeles and most of its cohorts. California's two automobile clubs supported the program (the Northern club more vigorously than the Southern, perhaps because of the location of the oil industry). It appeared that the press was virtually unanimous in favor of the Collier program, but its political influence did not seem to be a major factor.

Fairly well into the special session, it appeared that the Assembly was getting a bit restive under the continuing pressure. Its first effort to curry favor was to establish a Committee of the Whole (some 80 members) to consider the Collier bill. I had the "pleasure (?)" of testifying for two or three days on the content and intent of the bill. Others (both proponents and opponents) testified as well; but no definitive actions were taken by the Committee.

The next abortive effort initiated by the Assembly some weeks later provided for a "Resolutions Committee" of some ten members (five from each house). My duty was to serve as the sole "resource person" for the group. Some witnesses pro and con were invited to testify, but the press were excluded. The Committee met nightly for about two weeks. At each meeting there was a concluding vote, the senators voting for a three-cent gas tax increase and the Assembly members for a one-cent increase (with conforming amendments to be supplied later). Each vote ended in a 5-to-5 tie, and finally the Committee agreed to report that it could not resolve the differences between the houses.

Notwithstanding the resulting pervasive gloom, Senator Hatfield sounded a note of optimism. As the special session dragged on through the winter and spring, Senator Hatfield suggested that the highway bill would pass in mid-summer when the Sacramento heat set in. The Capitol buildings were not airconditioned--not the offices, not the hearing rooms, not the chambers, nothing. The Senate could hold the Assembly in session after the Regular Session had adjourned. Then, and probably only then, the 1947 Highway Program would pass. The hot sun would make highway policy for California; and so it came to pass.

Everything was at a standstill for some time, but finally a breakthrough came. No one seems to know quite how or why--whether it was pressure from proponents or simply pressure from the heat of summer--but the Highway Bill suddenly appeared on

the Assembly floor for approval. A vote was taken after a rather listless debate.

The poll climbed up to the number of votes needed for approval, after which some ayes turned negative and defeat seemed certain. But after some time of near-panic on the floor and frantic action by various lobbyists, it appeared that a settlement had been reached. A new vote was taken and a substantial majority of aye votes was achieved. It seemed apparent that a sizeable number of Assembly members had been relieved of their earlier commitments to oppose the program. Quite a number of legislators later asserted to me that they had supported the program all along, but simple research proved that every vote of theirs had been in the negative until the last vote of approval. Within a day or two, the amended bill was approved by the Senate and sent to the Governor for signature; one amendment set the gas tax increase at 1½ cents per gallon.

However, it was rather an empty victory. The amount of money to be raised by the 1947 bill was just about one half of the amount sought by the Committee and the Senate. But half a loaf is better than nothing. It took a sustained effort of four more years to raise the levels of financing up to what had been proposed in 1947. Even so, the program was on its way, and stays largely as it was initially enacted with the exception of two features whose seeds were planted in 1947 but germinated in the 1950s.

The first was enactment of the law creating the California Freeway and Expressway System which did much to curtail future opposition to freeway development. The second was establishment of the Advance Right-of-way Acquisition Fund which may have saved millions of dollars by forestalling developments that would later have to be acquired for new freeways.

Perhaps of greater significance policy-wise was the separate legislation establishing ITTE at the University of California in 1947. Hatfield had suggested a separate bill for ITTE in consideration of legislative protocol. Typically, University of California matters of legislation were handled by the Senator from Alameda County, in this case Arthur Breed, Jr., and were then shepherded by the University's lobbyist, James Corley.

Yet, the bill was almost lost by default in the tumult and turmoil of the special session. Just before adjournment, someone (perhaps Senator Hatfield himself?) remembered that the ITTE legislation had not been enacted. It had been languishing

in the Senate Transportation Committee. A hastily called meeting in the Senate Cloakroom brought out the bill for Senate action just before adjournment. It was sent to the Governor for immediate signature, and ITTE was born. But it remained for Harmer Davis to give it life, a subject I intend to discuss later.

The Early Days of the Institute of Transportation and Traffic Engineering

Homburger: Now how about how you eventually got to Berkeley?

Zettel: Actually, it was a simple two-step journey. First, I needed a job after completing my work in Sacramento in 1947. Francis Carr asked me to come to Pacific Gas and Electric Company to join him in the Property Tax Department. After a year or two in San Francisco I began to feel that I had helped Francis as much as I could and became a bit restive. I let it be known that I should make a move, perhaps back to the transportation field. I suspect that Carr or Senator Collier let this fact be known. In any case, I was soon interviewed by Professor Davis and Dean O'Brien, and was offered a position as Lecturer and Research Economist at the Institute, a position I accepted with alacrity, enthusiasm, and hope.

Homburger: During your early years with the Institute you still spent a fair amount of time helping Senator Collier.

Zettel: Yes, Wolf. Harmer permitted me to work with Senator Collier and other legislative committees on transportation issues, sometimes as an extra-curricular activity, other times on full-time leave. In 1951, for example, a new Collier program raised taxes just about to the level originally proposed in 1947. On other occasions the California Freeway and Expressway System and the Advance Right-of-Way Acquisition Fund, which I mentioned earlier, were established within the state highway system. At another time I spent two years or so as the highway specialist on the Eisenhower Commission on Intergovernmental Relations. My last "outside" effort was as Study Director for the Bay Area Transportation Study Commission.

Homburger: Did you do any joint work with Harmer on policy, or did you work mostly in parallel?

Zettel: In this connection, I would mention that Harmer was of great assistance to me in conducting the work of the Bay Area studies. As an example, he served as chairman of the Commission's Task Force on Urban Transport Innovations.

But generally we worked in parallel; he on engineering matters and I on economic and financial issues. However, we usually reviewed each other's writings. In part this was to avoid possible gaffes in each other's works, but perhaps more importantly to learn from each other.

One instance of our joint effort, however, deserves special mention. There had been created, partly at the urging of Professor James Nelson of Washington State University and supported by Julia Butler Hansen of the Washington Legislature, a "Western Interstate Committee on Highway Policy Problems." Somehow or other (probably at Senator Collier's urging) Harmer and I became unofficial advisors to the Committee whose members were attempting to learn policy from each other and to emulate California's success in passing a major highway transportation program in the early postwar era.

One nice bonus of this effort was the opportunity to meet in various states, mostly in state capitals, throughout the West and discuss transportation programs and policies with state legislators. I vividly recall meetings in Washington, Oregon, Idaho, Colorado, New Mexico, Montana, and Arizona, all of which were profitable and enjoyable. Once again, Harmer proved his worth by making major contributions to the work of the Western Interstate Committee.

I might conclude on that note today. If I may, I would like to make another tape because these two hours have too much discussion of Zettel and too much on the 1947 highway legislation. What I hope to do is to concentrate on the contribution of Harmer Davis in building the Institute of Transportation and Traffic Engineering virtually from scratch. What I would like to emphasize is this: the legislature conceived ITTE, Harmer nurtured it and gave it substance.

[Interview 2: May 13, 1993]##
[Edited and Rewritten by Richard Zettel in June 1993.]

Harmer Davis and the Staffing of the Institute

Homburger: Let's talk a little bit more about Harmer Davis.

Zettel: Thank you, Wolf. I will, because I now realize that the last time we taped, I spent too much of my attention on origins of the bill establishing the Institute as well as on background of the Collier-Burns Highway Act of 1947 which was enacted at the

same legislative session and involved the same people. I now feel that I should have said more about Harmer's role in the establishment and operations of the Institute at the University of California--now the Institute of Transportation Studies (ITS) but originally the Institute of Transportation and Traffic Engineering (ITTE).

Perhaps I should repeat here that promotion of the action by U. C. was an outcrop of the Hatfield-Dearing discussions of what might be done to improve county road administration in California. This is one feature of the 1947 legislation that provoked no controversy, but was almost overlooked in the final turmoil of the legislative session.

It is important to note that the enacted legislation contained little as to what the Institute should actually do. To my knowledge there were no instructions nor any guidelines. As was to be expected, it took some time for the University to take action, but it finally settled on H. E. Davis of the existing engineering faculty to be Director of ITTE. This was perhaps a fortuitous choice; but there was no question but what it was an extremely wise one. I believe it fair to say that Davis had carte blanche to create an Institute of merit out of what seemed to be "whole cloth".

Seeing much more than improved county road administration as an objective, Davis immediately broadened the scope of interest of the Institute to encompass city streets and state highways as well as county roads. Also, early on, he added traffic and safety engineering to the Institute's concerns. He had the foresight to expand the Institute's engineering activities from Berkeley to UCLA.

Harmer had a unique ability to work effectively with state legislators, academics, theorists, planners, and working engineers. I have personal knowledge that Senators Collier and Hatfield were much impressed with his technical knowledge and his talent in bringing ITTE to life.

Perhaps most importantly, Harmer was able to assemble a staff that proved to be capable and productive. Disparate disciplines displayed respect for each other and cooperated enthusiastically, which made their joint efforts greater than the sum of the parts.

At the risk of forgetting or overlooking someone, I will mention some of the staff for whom I had very high regard. For example, Dan Belmont, with whom I commuted from San Francisco for several months during which time I learned something of math and computers, even though I resented his continuing

ability to master me in the game of contract bridge. Norman Kennedy, one of the new breed of traffic engineers who was a favorite lunch partner of mine. Donald Berry, professor of traffic engineering, who recruited the young team of Kell and Homburger, both of whom added talent to our to staff. Wayne Snowden, a gifted writer, was especially helpful in improving the staff's written output. What talent I may have had was vastly improved by his constructive criticism of my prose. I also had the pleasure of working with Professor Bob Horonjeff (who became our resident air transport specialist) in a study of airport financing at the behest of Senator Steve Teale, who hoped to emulate in the air transport field Senator Collier's success in the highway field.

Richard Carll, who was sometimes regarded as my assistant because of his enormous knowledge, deserves special mention. Dick was a brilliant young economist, a protege of Professor Nelson of Washington State University who was a recognized authority on transport economics. Carll was much more than an "assistant". We worked together on a number of difficult projects. He always proved to be a deep thinker and an incisive critic, which helped greatly to improve the quality of our work. I learned much more from him than he ever learned from me.

Last, but by no means least, I would like to talk about Bob Glenn's role. Bob came to us from Oregon State College, and immediately became the Institute's field representative. He had a particular talent to deal with practicing engineers, especially those who had become the county road commissioners mandated by the Collier-Burns Highway Act. He acquainted himself with the county folk and developed an ongoing rapport with city street personnel as well. Not only did he advise these people as he could, but he brought their problems and concerns to the Institute's staff for such assistance as it might render. Indeed, he seemed exactly to epitomize what the legislature had in mind when it encouraged the University to establish an Institute to assist local officials in carrying out their work. It should be added that Bob rendered much help to the State Highway Division and became a valued conduit of information between local and state personnel.

This seems to be an appropriate place to discuss another development that became a major feature in improving county road administration, and city street practices as well. Fairly early in the Institute's endeavors in carrying out its perceived mission, there was organized an annual meeting of professionals interested in highway transportation, held alternatively at U. C. Berkeley and at UCLA. This affair became popularly known as Road School. It received much

approval from many legislators who felt it was precisely what they had in mind in supporting establishment of ITTE. For a number of years, Senator Collier was a fixture as the keynote speaker, but other legislators often participated.

More than simply an occasion for meeting at the University, the Road Schools provided opportunity for annual get-togethers of county road commissioners and city street engineers, who held what amounted to annual conventions of their respective organizations at their separate hotels. They also held joint meetings as occasion warranted and invited participation of state highway officials in addressing their mutual concerns.

Close association and participation in the Road Schools led to cohesion and camaraderie among all of California' highway transport engineers that greatly eased the way for subsequent legislation dealing with funding and/or administration of the state's transport facilities.

Such were the joint contributions of Harmer Davis and Bob Glenn acting in concert with and enlisting the full support of the Institute's staff in furthering their efforts.

I have not given well-earned credit to everyone who deserves it as I have rushed through Harmer's many accomplishments in staffing the Institute. Therefore I should backtrack somewhat at this point. I should mention Lee Rothgery's and Norene Jordan's capabilities in early administration of the untried program. The participation of Professors Carl Monismith and Jim Mitchell deserves mention as well as does the early contribution of Adib Kanafani (the current Director) and Ed Sullivan. Phil Pickering and Bob Cron added immeasurably in the field work. The "shop" supervised and operated by Russ Newcomb and John Nauta abetted the research efforts.

Throughout the early years we had the guidance of the widely revered Ralph Moyer, an accomplished product of Iowa State, and Donald Berry, a national leader in the traffic engineering discipline.

I should also make note of the initiation and continual expansion of the Institute's transportation library by Beverly Hickok and her staff. Because of her perceptive leadership and Harmer's support, it soon became one of the finest transport libraries in the United States.

As always in guiding the Institute's development, Harmer insisted that the staff "keep up with the times". He was

instrumental in bringing to Berkeley the many talents of Gordon Newell, Dolf May, and Carlos Daganzo. Not only did these "pros" keep up with the times, they actually "made the times".

I could go on and on, but my point has been made. Could anyone but Harmer E. Davis have assembled, guided, renewed, and updated the Institute staff to accomplish its missions as faintly perceived by the Legislature and the University years earlier?

May I conclude my remarks at this point? Any questions?

Homburger: Well, you modestly didn't mention your own joining the staff, for which I presume you also give Harmer Davis credit.

Zettel: I did not discuss myself because the nucleus of the Institute staff and its focus and direction had been well established before I arrived there. I had observed with growing interest its development and maturation over the early years. So, when an offer came to become a member, I accepted with enthusiasm as I pointed out earlier.

If my efforts at the Institute were useful and productive, of course Harmer deserves the credit, for he brought me there and gave me the freedom and opportunity to explore my interests in depth and to participate on numerous occasions with political entities and others of importance in the transport field. Moreover, he was a welcome and much-needed counselor for me at that time, and he gave to me much opportunity and freedom to pursue my personal interests, and to counsel with political and other leaders in the transport field. It was my good fortune to spend so much time and effort with Harmer E. Davis.

I would stop now.

Homburger: Thank you very much.

XII HARMER E. DAVIS TRANSPORTATION LIBRARY DEDICATION SPEECHES

April 22, 1996

[*Editor's Note:* Because of a recording malfunction, the last part of Professor Davis' remarks are missing.]

Professor Adib Kanafani

Kanafani: Good afternoon, ladies and gentlemen. My name is Adib Kanafani. I am the director of ITS, and on behalf of the Institute and the University, I would like to welcome you this afternoon to a very special event. We are gathered here to honor a colleague and a friend, and to dedicate one of our best assets to a man, who for so long gave us his best.

Today, we are dedicating the Institute's library to Harmer, and we are honoring the library by naming it after him and calling it the Harmer E. Davis Transportation Library. This is a fitting tribute to a man whose vision and foresight we continue to see materialize today: over sixty years since he joined the faculty at Cal, nearly fifty years since he started the Institute of Transportation Studies and its library, and over twenty-five years since his retirement.

"Long ago, man's practical approach to prophecy was summarized by the poet who forged the phrase, 'And coming events cast their shadows before.' Today, as always in human affairs, we strain to make our estimations of what will take place tomorrow. Whether we are concerning ourselves with the destiny of a civilization about to blossom or to wither, or whether we strive simply to grasp the direction of commonplace affairs, we peer at the signs and portents, and try to shape our plans."

What I just said was a quotation from one of our Harmer's papers in 1954. The paper was entitled, "101 Billion, 365 Million Dollars for New Roads." [laughter] In that paper, he predicted that it was going to take that many dollars to meet the needs of highway infrastructure in the then coming twenty years to accommodate the two hundred million people expected in the United States by then.

He was not far off. Expenditures during that period were about a hundred and thirty-five billion dollars--but, hey: he was right on the population estimate. [laughter]

Harmer went on to write equally poetic and forward-looking gems in the early days of his career. In 1959, he wrote a paper called, "A Transportation System for a New Planet," in which he described how you would go about designing a transportation on the featureless plain of a new planet to be colonized by the then predecessors of our space program. Of course, working a featureless plain has been a dream of city planners ever since the profession began, and Harmer was no different.

Then, in 1966, he wrote another paper entitled, "Technology, Transportation, and Society: Shadows of 1986." He was seeing the shadows of the future, again, just as his poet did. In that paper, he pretended to be in 1986, and reflected about the previous twenty years, back to 1966. Here, too, he made predictions, and here, too, he hit a few and he missed a few. In 1966, Harmer predicted technological developments in transportation, including automation--a subject that has become central to the agenda of the Institute's research in the last few years. He predicted containerization, including what we call today AVI and AVL. Of course, he didn't use those fancy words, but he predicted AVI and AVL in 1966. He predicted Intermodalism, and, again in his poetic style, he said, "From abode to abode, we carry the load regardless of mode." [laughter]

But he did miss a few predictions. He predicted the SST, and he predicted regionally coordinated metropolitan transportation planning. So he did miss a few.

We would understand if Harmer has forgotten some of these writings. I did not know about them, myself. But for the library, I wouldn't have, and much of these treasures would have been lost. But for the library's assistance, I wouldn't have been able to determine the amount of money spent on transportation in the twenty years between 1956 and 1976--but for our librarian's able reference skills to dig out the number for me at the last minute.

Libraries represent the traditions of cumulative knowledge, of the continuity of vision, and of lasting institutions --and it's only fitting that we dedicate our library to the man who best personifies these traditions. So I'm happy that we have you here, today, for this brief ceremony with a very important function.

It's my pleasure to introduce Joseph Cerny, our Vice-Chancellor for Research, to make a few remarks on behalf of the University. [applause]

Vice Chancellor Joseph Cerny

Cerny: I also want to welcome you all here on my behalf and that of Chancellor Tien, who at the moment is in China.

Throughout his forty-three years of service to the University, Harmer Davis made seminal contributions that have helped define the field of transportation engineering as we know it today. He's helped educate generations of transportation professionals--many of whom have gone on to become important academicians and practitioners.

Harmer's research work through his long career spanned many fields of engineering, including soil mechanics and concrete design. His work in transportation planning, and the application of economics to transportation engineering was pioneering.

He achieved national stature early on in his career and became a member to the Highway Research Board, later the Transportation Research Board, which he chaired in 1959. Through the period 1958-1970, he received ten awards from the American Society of Civil Engineers, including the Norman Medal in 1960, the Croes Medal in 1962, and the Terzaghi Lectureship in 1967. He became a member of the National Academy of Engineering in 1970. At the time of his retirement, the national and international stature of Harmer Davis was probably unequaled in the world in the field of transportation.

In 1947, Professor Davis was asked to establish an Institute of Transportation and Traffic Engineering by University President Robert Gordon Sproul and Engineering Dean Morrough P. O'Brien. He personally selected an initial professional staff --I'm told the librarian, Beverly Hickok, is with us today, but I haven't met her yet-- [applause] and a support staff. His clear judgement regarding who and what was needed assured that the Institute, now ITS, would be the prestigious research organization that it became well before he retired.

One of Harmer's most important contributions was the creation of the Institute of Transportation Studies' library in 1948. The ITS Library has become an important special library in the transportation field. From a small early collection that included donations from Harmer's own holdings in transportation engineering, the Library's collection has grown to more than 150,000 volumes, 125,000 microfiche, 3,000 current serial

titles, and additional materials such as manuscripts, maps, and aeronautical charts. Since he retired in 1973, he's continued to give generously of his holdings to this library.

In recognition of Harmer's truly exceptional contributions to the welfare of the University, and his distinction as a teacher, the administration is now delighted to join you in naming the ITS Library the Harmer E. Davis Transportation Library. [applause]

Alumnus Robert Crommelin

Kanafani: Thank you very much, Vice Chancellor Cerny. We now have two former students of Harmer who would like to make some remarks in honor of Harmer: one student alum and one who is a faculty member. I would like to ask Bob Crommelin to come up and say a few words.

Crommelin: In 1947, I came to Cal as a junior from Modesto Junior College, enrolled in civil engineering with a transportation option, and, for the first year, took some very interesting classes from Professor Francis Foote. I learned the economics of railroad location; I learned railroad engineering; and several other courses, and helped him out as a T.A. for a while.

In 1948, when I came back after the summer, there were some new courses on the list of things that a senior might be able to take. One was traffic engineering. I thought to myself, "What the hell is that?" It was three units, and I needed three units, so I took traffic engineering from Don Berry.

I didn't realize at the time that it had only been a year that the Institute had been in existence. In one year, that gentleman over there had created a concept, a staff, and put together a wonderful program. We had Cecil Van Til, who taught --I took my traffic engineering lab from him; Don Berry, as I mentioned; highway engineering was Ralph Moyer. (As you get old, you tend to forget things.) So, I had this wonderful group of people to teach me, and so, instead of becoming a railroad engineer and being retired from the Southern Pacific now, I'm still working as a traffic engineer down in Palm Desert. So I thank you, Harmer, for keeping me busy for all these years.

In between semesters, there was some bunch of old people that were on the campus. They were in their thirties and forties, you know, really--I was twenty at the time. But I have the proceedings of the first California Institute on Street and Highway Problems, held here at the University at

Berkeley, January 31 to February 2, 1949--just a few years ago. And the Institute of Transportation and Traffic Engineering put on this conference for, generally, public employees--where they would come to Cal and learn what the current status of things were. It's still going on now--not as good as then because I don't think anybody drinks anymore like we used to. [laughter]

But, Harmer, I had my secretary blow up the first part of it--expand the size of the print for you, so it might make it easier for you to read. I'm going to donate the book itself to the library as their second copy. They already have one copy, I understand, but I save everything, so this is my donation, and thank you very much for being you. By the way, his name is not Harmer E Davis; I think it's really Harmer S Davis, because all the time I was an undergraduate, I always heard him referred to as "Stinky" Davis. So the "S" must be--. [trails off into laughter]. But thank you, Harmer, for being you. [applause]

Professor Carl Monismith

Kanafani: Professor Monismith was another one of the lucky ones to have been one of Harmer's earliest students. So: Carl.

Monismith: Chairman Adib, ladies and gentlemen, I really feel very privileged to have this opportunity to talk with you about Harmer Davis, but I think it's very important, also, that as we talk about Harmer, we talk about the Department of Civil Engineering, of which he was a part for so long.

Harmer received his B.S. degree in Civil Engineering in 1928, and he obtained a master's degree immediately thereafter, which was, at the time, very unusual. His master's degree was in--of all fields--the concrete area. It's important, then, to take a look at the program. He's been a member of the faculty since 1930, although he served in a research capacity even prior to that. Thus, although he had forty-three years of official service as Provost and Vice Chancellor Cerny noted, in actuality it was at least forty-five years--and even longer, since he worked as a research assistant in the laboratory while he was an undergraduate student.

As noted earlier, Harmer is a graduate in civil engineering, although originally he enrolled to be an architect; he saw the light very early on, as I understand it. [laughter] As we take a look at the University, people have talked about the Institute briefly in the last few minutes, but I think it's important to see the role that civil engineering has had to play in this.

It actually started at Berkeley in 1872. The University was actually established in 1868, and the charter provided for the establishment of six colleges. These included agriculture, chemistry, letters, and--very importantly--civil engineering, mining, and mechanics. Thus, while the civil engineering college was actually started in 1872, the first person received a degree in 1873.

One of the first persons to head Civil Engineering was Frank Soule, who served as dean of the college from 1896 to 1907. He was followed by Charles Derleth, an outstanding civil engineer. Sometimes I worry that we forget about this particular man, because I am sure he has had an impact on a lot of students who have gone through here, and I'm sure he had a very significant impact on you, Harmer, in your budding career at the time. Derleth was the Dean of the College of Civil Engineering from 1907 to 1929, and then Dean of the newly-designated College of Engineering from 1929 to 1942. One of the interesting things was he believed that people who got their bachelor's degree should go out and work.

Well, Harmer didn't quite fit the role; on the other hand, Derleth saw in Harmer a real star at the time, and Harmer was actually hired as an instructor in 1930, and has been with the Department of Civil Engineering since then.

In 1943, Morrough P. O'Brien became Dean of the College of Engineering, and served until 1959. It was during his era that the graduate program began to evolve. Harmer played a very, very important role in this--particularly in his activity as director of the Institute.

It's very important to realize that in his activities there, there were things in his background that I'm sure impacted on what he did. For example, in 1920, Raymond Davis--and the building which we're in was named after him--was appointed to the faculty in 1920. He developed a structural testing laboratory, which was on the site of the current building. Within that building was a big testing machine that allowed you to apply loads--four million pounds in compression and three million pounds in tension--and it became a very important part of the development of the infrastructure of the Bay area. Harmer became a part of the group working on that big testing machine.

In addition to this, the laboratory, under Raymond Davis's direction, became very interested in the work in cement and concrete. When you look at some of the modern developments, today, we have what we call pozzolanic cement--this had been developed for Boulder Dam here at Berkeley, and Harmer was

involved in that. In the case of Bonneville Dam, when you build large dams of concrete, you are concerned with heat development from cement hydration. Low-heat cement was developed here, and Harmer was a part of that.

In terms of the San Francisco-Oakland Bay Bridge: this was a bridge that was unprecedented at the time. One of the problems was: should we have multiple suspension spans between Yerba Buena Island and San Francisco, or should we, perhaps, consider something else because of seismic considerations? Well, they built a model. Harmer was involved in the model that led to the actual construction of the central anchor. Then, very importantly, when we take a look at the foundations that were built for this--this was unprecedented because the water was deep, and the good load-bearing soils occurred at large depth. It was beyond the general realm of what had been experienced in civil engineering practice at that time.

Moran--of the firm Moran, Proctor, Mueser, and Rutledge--was called in to design these foundations. I received very recently, Harmer, a book--Seventy-five Years of Foundation Engineering--associated with that firm. One of the factors of concern was the settlement of the foundations of the west part of the bridge. Moran then asked the University to do some consolidation testing. At this time soil mechanics was a budding field. Harmer agreed and did the testing, and there is reference not directly to you, Harmer, but to the fact that these consolidation tests were done here at the University. (I would like this book to be in the library also.) It is important to note that he really got soil mechanics started at Berkeley.

Of course, later in his role as a Director of the Institute, he made a very good hire, Harry Seed, to develop the soil mechanics program. Then, very importantly, he provided financial and staff support in order that this program could be viable. I think, today, that the program that we have at Berkeley stems from your efforts in this regard.

Also, Harmer recognized that there were other materials beside concrete and soils. He started work in asphalt technology very early on, and then was able to coerce Barney Vallerga to really get the asphalt program under way. Harmer provided support for this program to flourish as well. So, when we look at the early days of developments of what we call geotechnical engineering today in the asphalt technology area and pavements, Harmer had a very, very significant influence in this.

But that really doesn't cover his complete breadth. During World War II, for example, there were problems associ-

ated with Liberty Ships, and there was failure in steel. Harmer teamed with Earl Parker in our materials engineering group--I forget what they used to call it--and they wrote a very significant paper on the problems of welded steel (Parker, Davis, and Flannagan).

In general, the papers that Harmer has contributed over the years in fields other than transportation, have laid the groundwork for a number of fields of endeavor here at Berkeley.

We're very fortunate indeed to have had a person like Harmer Davis as a part of the University. His breadth of vision, his ability to look to different fields has been very important, and has made a difference. And Harmer, I'm very pleased that I've had the opportunity to work with you over the years, and I thank you very much. [applause]

Kanafani: Thank you Carl. Indeed, if you go to any of our automated library search systems, and write the name Harmer Davis, the first thing that will appear before you is his paper of 1933 about the design tests for the San Francisco Bay Bridge. It was called "the future San Francisco Bay Bridge" in those days, of course.

It's now my pleasure to introduce Dan Krummes and Catherine Cortelyou, the directors of our library, to do the honors of the official dedication.

Librarians Catherine Cortelyou and Daniel Krummes

Cortelyou: Thank you. I didn't know we'd have such an exalted role here.

As the present heads of the library, Dan and I are very much aware that we are the inheritors of an extraordinary legacy. The library today is recognized and used by a global patronage. We have become one of the outstanding transportation collections in the world. We owe this to the traditions of excellence established by our first librarian, Beverly Hickok, and by Mike Kleiber, our immediately preceding former head librarian.

Dan and I would like to make a small presentation, if Professor Davis would join us in the front here.

Krummes: We have a small presentation. We would like to present you with this citation that was done in-house by library staff on the new Harmer E. Davis Transportation Library letterhead.

Davis: Well, I'll be damned. [great laughter and applause]

Krummes: Now, we would like to unveil the portrait of Harmer that is going to be in the library after these festivities. So here we go. Here's Harmer. [applause] The microphone is all yours. Take it away, Harmer.

Response by Professor Harmer Davis (incomplete)

Davis: Do I have to take this away? [loudspeaker microphone is turned off] If I speak in my normal classroom voice, can you hear me back there? [voices saying yes] I don't have to hold this damn thing up? [laughter] No! [sound of microphone being tossed] Well, in the first place. I'm certainly--. [noises as someone takes the microphone away] See, I never would have known that. They never taught me about that sort of stuff. I just had to talk loud enough so the guys in the back row could hear what was going on. You can hear me back there, can't you? [more yes's, and someone calls, "They're falling asleep, Harmer. They're falling asleep."] [laughter] They're falling asleep? You haven't got any erasers up here. [laughter] That's a trick I got from Raymond Davis, whose name is perpetuated in this particular building. What he did--they had soft erasers in those days, and he taught me how to aim carefully if some guy went to sleep in the back row, and hit him right in the middle of the head--enough to wake him up and not to hurt him. [laughter] That class would laugh like hell, and that woke him up. [more laughter] So that's the way that started.

Well, anyway, I certainly appreciate the wonderful honor that you are bestowing on me and the nice things that you've said. I don't know whether they're all true or not, or whether they're simply magnified stuff. [laugh] But, at any rate, I guess there are two things that I ought to say at the start of this thing. The first would be how I became a book nut, and secondly, how I got involved in transportation.

On the love of books part, both my parents were avid readers, and so our house was always filled with books, particularly the writings of some of the better authors of both England and the United States--since they were English people to start with. So, with that kind of start, I ran into some more. When I went to high school--a little high school in New York outside of Rochester--and they had a wonderful English teacher there. So she bore in on the importance not only of how you put the language together, but some of the great things that were done in it.

Then the same thing happened again in a peculiar way. After I got into college and decided to stop being an architect because all they wanted me to do was write pictures in either ink or soft pencil, or read books about the ancient architec-

ture. Well, I didn't think that would help me very much in building anything: roads, streets, bridges, and so on. So I got the hell out of architecture, and came in as a very ineffective freshman in civil engineering in 1924. That made me a graduate of the class of '28, which I've always enjoyed.

I went through, I learned a number of things about transportation. We had a good course on transportation in the way of both railroads and highways. Also, when we went in as freshmen, we had--classes in surveying. Of course, as soon as you learned how to use the instruments, they gave you a job to do, and very often this was to lay out a railroad or a highway.

I remember when I first started in surveying, in order to get the difference in elevation, you had an instrument called a level which gives you a horizontal sight; and off in the distance they have a pole, and the guy that worked the pole would run a little sign up and down so that you knew that that was level with where you were, and then you could figure from that calibrated pole how high you were from here to that place. So we could measure the difference in elevation. When I was a student in surveying, why, I was out there at the upper end of the campus, one time, and practicing. So I was signalling the man there at the pole to raise this thing or lower this thing that gave it these numbers. There were a couple of female students somewhere near there, and they saw me and they said, "Hey, look, that man's trying to learn how to fly." [laughter] I'm not sure that that's what convinced me that aviation is an important part of transportation. But, anyway, it must have inspired me.

Another thing that came along, of course, was the other courses they offered in civil engineering: a good course in railroads and a good course in highways. So I got a little taste of it there, along the way. And then R.E. Davis was my mentor, and his field was in materials for construction, particularly concrete and this kind of thing that they could hold together buildings with. [tape ends]

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NOTE: Because of extensive rewriting and editing by Mr. Zettel, the resulting material cannot be associated clearly with Sides A and B of each tape.

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A. Senate Bill No. 1423, Chapter 1573, July 19, 1947. 115

B. Institute of Transportation and Traffic Engineering Quarterly Bulletin, Volume 1, Number 1, December, 1948. 116

C. "Scientists Work to Help Make Highways Safer and More Economical, Reduce Accidents," Motorland, May/June, 1957. 120

D. "Transportation: A Challenge for ITTE," Engineering News-Record, June 12, 1958. 123

E. Harmer E. Davis curriculum vitae (partial), ca. 1971. 127

F. Senate Concurrent Resolution No. 83, May 20, 1971. 130

G. Institute of Transportation and Traffic Engineering Quarterly Bulletin, Volume 14, Number 2, June, 1973. 132

H. "Two for Retirement," from Institute of Transportation Studies Review, Volume 4, Number 1, November, 1980. 138

I. Harmer E. Davis ballot statement, American Automobile Association, January 1988. 140

J. "Transportation Library Named for Harmer Davis," Berkeleyan, May 8, 1996. 141

K. Biographical Record: Harmer E. Davis. Updated 1997. 142

L. Testimonial Resolution, California State Automobile Association, January 24, 1997. 158

Senate Bill No. 1423

CHAPTER 1573

An act making an appropriation to the Regents of the University of California for establishing and operating an institute of transportation and traffic engineering.

[Approved by Governor July 19, 1947. Filed with Secretary of State July 19, 1947.]

I object to the item of appropriation in Section 1 of Senate Bill No. 1423 and I reduce that appropriation to three hundred fifty-five thousand dollars ($355,000). As so reduced I approve the bill. In making this reduction it is my intention to eliminate all money for land and headquarters building and to make available for expenditure as provided in the bill during the Fiscal Year 1947-1948, $225,000 for field station instruments and facilities, $50,000 for highway materials and structures, and $80,000 for administration (including maintenance and supplies).

EARL WARREN
Governor of California

The people of the State of California do enact as follows:

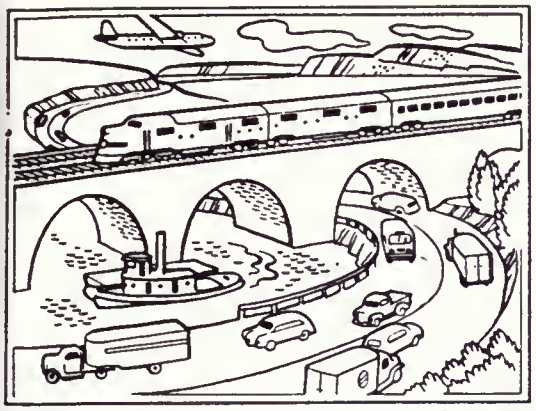
SECTION 1. Out of any money in the State Treasury not otherwise appropriated there is hereby appropriated the sum of nine hundred twenty thousand dollars ($920,000) to the Regents of the University of California for the establishment of an Institute of Transportation and Traffic Engineering in the Department of Engineering of the University of California, at Berkeley. Said institute shall carry on instruction and research related to the design, construction, operation, and maintenance of highways, airports, and related facilities for public transportation.

SEC. 2. To the extent deemed appropriate by the regents the Institute of Transportation and Traffic Engineering shall cooperate in research with the State Division of Highways and with other agencies charged with responsibility for the design, construction, maintenance, and operation of highways, airports, and other related facilities for public transportation. In addition to, but not to the exclusion of, other appropriate subjects for research and study, the institute shall give attention to the interrelated problems of highway design, traffic control, and highway safety.

SEC. 3. The sum hereby appropriated may be expended as follows: The whole or any part thereof for buildings, land, equipment, instruments, and personal services as determined by the regents to be necessary for the acquisition of physical facilities appropriate to the purposes of the institute, and not more

Submitted by Sen. Hea. Hatfield

than one hundred sixty thousand dollars ($160,000) thereof for personal services, supplies, instruments, equipment, and services other than personal, necessary for the operation of the said institute during the Fiscal Years 1947-48 and 1948-49.



Institute of
QUARTERLY BULLETIN
TRANSPORTATION and TRAFFIC ENGINEERING
University of California

Volume 1 BERKELEY, CALIFORNIA, DECEMBER, 1948 Number 1

Advisory Group

• policy committee meetings held

TWO MEETINGS of the Advisory Committee of the Institute of Transportation and Traffic Engineering have been held thus far for the purpose of reviewing progress to date and to plan close coöperation between the Institute and public and private agencies in the field of transportation. The Committee, appointed by President Robert Gordon Sproul of the University of California, met first on the Berkeley campus on October 8 and at the U. C. L. A. campus on November 19.

Dean M. P. O'Brien, Chairman, Department of Engineering, University of California, Berkeley, presided at the two meetings, which were marked by discussions conducted on many important and interesting subjects and participated in by members of the Committee and members of the staffs of both branches of the University.

Formation of sub-committees to determine long-range Institute policies on research, recruitment and traffic training; reports on the progress of the current In-Service and academic educational programs, dissertations on the existing and anticipated traffic instrumentation developments, discussions on means of aiding instructors of California secondary schools in teaching students how to operate motor vehicles as they are now charged under a new state law, approval of a pattern for the newly created California road conference sponsored by the Institute—these and numerous other related subjects were developed at length by those in attendance.

Particular attention was given to details of the courses and seminars of the Western Institute for Traffic Training, scheduled for the Berkeley campus between January 31 and February 11, 1949, at which several hundred professional persons in transportation are expected to be in attendance.

The Committee members were given detailed reports of progress made by the Institute in its work at the two branches of the University. Professor Harmer E. Davis, Acting Director of the Institute, related past and proposed activities at Berkeley where administrative headquarters of the Institute are situated, and where graduate and undergraduate instructions leading to degrees in transportation are offered, and where campus facilities are available for research in various fields of transportation. Professor L. M. K. Boelter reported on developments at the U. C. L. A. campus. There the Institute program emphasizes the problems of driver characteristics and safety. The U. C. L. A. Institute staff has performed considerable research on the relation of the vehicle driver to road operations and extensive additional investigation is mapped for the future. In addition to engineers, the U. C. L. A. branch of the Institute has psychologists and physiologists on its staff.

The Institute of Transportation and Traffic Engineering was established following enactment of Senate Bill No. 1423 by the Legislature of the State of California in 1947. The Institute's express purpose is to aid in development of California's state highway program, and while the immediate objectives of the Institute relate to the development and improvement of highways, the Act is broad enough to permit ultimate attention to other modes of transportation.

Continued on page 3

In-Service Training Is Offered in Many Fields

An In-Service Training Program, designed to accommodate engineers already engaged in work in transportation fields, has been initiated by the Institute of Transportation and Traffic Engineering, and although the program was activated only six months ago it has engendered genuine interest among those interested in the establishment of a sound and long-range education program outlined to improve State, county and city transportation systems. Already more than 1,000 interested persons have attended conferences and classes staged by the Institute.

Lectures, conferences, seminars, road schools, short courses and full-term Extension courses, conducted by engineers and educators of outstanding abilities, are among the media which are employed in this program. The general public, too, will benefit by the program in that the public will be kept informed of operations and developments in the transportation world.

The Institute has completed several of these In-Service Training classes. An initial conference on "Highway Planning" was held at the Los Angeles campus of the University of California at which Roy E. Jorgensen, Chief Engineer of the Connecticut State Highway Department, was the principal speaker. Mr. Jorgensen later appeared at a public meeting held on the Berkeley campus and discussed the timely subject "Freeways and Super-Highways."

Instrumentation of the Stockton Test Track by the United States Army Engineers was discussed by Robert Horonjeff, of the San Francisco Office of the U. S. Engineer Office, when he presented a motion picture illustrating the construction and operation of the Stockton project.

More than 240 practicing engineers enrolled in a series of six three-hour weekly lectures on "Design and Control of As-

Continued on page 2

College-Level Courses

Numerous new courses for transportation and traffic engineering majors have been inaugurated at the University of California at Berkeley through the joint efforts of the Institute of Transportation and Traffic Engineering and the Division of Civil Engineering.

The new courses include both graduate and undergraduate studies and are designed to provide broad training and to stimulate interest in the field of transportation and traffic engineering.

Donald S. Berry, Assistant Director of the Institute and Professor of Transportation Engineering, is conducting a course entitled "Traffic Engineering," which includes the study of traffic characteristics and related subjects, as well as traffic surveys and their analysis and interpretation.

Ralph A. Moyer, Professor of Civil Engineering and Research Engineer in the Institute of Transportation and Traffic Engineering, is conducting a course entitled "Highway Planning and Design," for graduate and professional men. His course covers criteria for planning of highway systems and for highway design and includes a study of economic factors in the selection of routes.

Two courses in "Airphoto interpretation" are being conducted by Cecil J. Van Til, lecturer in the Institute of Transportation and Traffic Engineering, for which both graduates and undergraduates are eligible. Salient features of these courses are studies of elementary photogrammetry and airphoto interpretation and their relation to transportation engineering, soil formation and soil identification, and kindred subjects.

Other additional courses will be added in succeeding terms.

D. P. Krynine, Professor of Civil Engineering at Yale University, will offer courses in soil mechanics during the spring of 1949 on the Berkeley campus and through the University Extension Center in San Francisco. Professor Krynine is a recognized authority in this field and a large enrollment is expected when he conducts his courses. Additional details on his lectures will be forthcoming.

Robert Horonjeff, of the U. S. Engineer Office in San Francisco, will continue his course in "Airport Planning and Design" for graduate students with the course including location, planning and construction of modern airports.

Expansion of these studies is anticipated in plans being made for courses in "Urban Transportation," "Regional Planning," "Transportation Economics," "Highway Structures," "Highway Materials," and others.

An over-all educational program for both graduates and undergraduates has been set up. This program is designed to provide highly trained engineers in the transportation and traffic engineering fields. Suitable courses of study lead to advanced professional degrees.

The undergraduate program is arranged to provide students with courses which will enable them to enter the transportation and traffic engineering field upon completion of requirements for a B.S. degree. The first two years of the courses will follow the same curricula outlined for all engineers. During the last two years of the courses, however, students in the transportation option will undertake courses in "Highway Engineering," "Railroad Engineering," "Elementary Traffic Engineering," "Transportation Economics," "Highway Materials" laboratory, "Highway Bridge Design" and "Reinforced Concrete Design." During the four-year period 9 to 12 units will be set aside for nonengineering studies. The current Junior class is now entering on this revised course of study in transportation option.

Considerable latitude is permissible in the arrangement of a graduate program so long as an appropriate objective and suitable quality of work are assured. Subjects described earlier in this article will be included in the graduate curricula. In addition to regular classroom work the Institute's policy will require 3 units of graduate research for all candidates for the Masters Degree.

Transportation Library

Development of a library on information on transportation is an Institute project. An adequate library is necessary to support both the education and research activities of the organization. The Institute hopes, through the purchase of publications and through gifts, to develop a library which will serve as the West Coast repository in the field. The Institute has engaged a full-time librarian who is charged with the duty of acquiring a working collection of publications and cataloging the acquisitions. Thus far more than 660 books, pamphlets and serials have been obtained.

Statistical Information

The Institute plans to perform a service by coöperating with State-wide agencies in the collection and summarization of various statistical data showing the status of highway conditions within the State.

In-Training Service

Continued from page 1

phaltic Mixtures" offered by the Institute beginning with last June 5. Vaughn Smith of the California Research Corporation conducted the first two lectures on asphalt and the remaining four were conducted by Francis N. Hveem, staff and research engineer of the Materials and Research Laboratory of the State of California, who presented the theories and methods used by the State in designing asphaltic pavements, and a dissertation on the behavior of asphaltic mixes and their desirable properties, a course offered through the Department of Institutes of the University Extension Division. A repeat session was recently completed at the Los Angeles campus with Fred Scott, of the Union Oil Company, presenting the first two lectures, and Mr. Hveem the remaining four. This asphaltic pavement course is next scheduled for San Diego and then Fresno.

Plans for a "road school" of state-wide interest is scheduled for January 31, February 1 and 2, Berkeley campus. The three days will be devoted to discussions on topics of vital interest to those interested in highway engineering, especially administration and budgetary problems. Sessions of special interest to county road engineers and to engineers concerned with urban transportation problems will be offered.

Also planned is the first Western Institute for Traffic Training, scheduled for the Berkeley campus between January 31, 1949, and February 11, which will parallel the highly successful one conducted at Northwestern University in July of this year. The forthcoming traffic and training program will include such courses as "Driver Education and Training," "Traffic Engineering," "Accident Records and Their Uses," "Pedestrian Protection," and many others.

Additional details on these forthcoming and other In-Service Training programs will be distributed throughout the State by the Institute of Transportation and Traffic Engineering, with dates, descriptions of the subject material, lecture locations and other pertinent data.

Quarterly Bulletin of the
INSTITUTE OF TRANSPORTATION AND TRAFFIC ENGINEERING

A division of the Department of Engineering of the University of California, established in accordance with an Act of the Legislature of the State of California, approved July 19, 1947.

PAT MARTIN . . . . . Editor

The Institute Staff

(Berkeley Campus)

HARMER E. DAVIS, acting director. Special field—construction materials.

DONALD S. BERRY, assistant director. Special field—highway traffic and safety.

RALPH A. MOYER, research engineer. Special field—highway design and highway economics.

CECIL J. VAN TIL, lecturer. Special field—airphoto interpretation and traffic.

FRED N. FINN, lecturer. Special field—soils, and serves as administrative assistant and office engineer.

NORENE M. JORDAN, secretary, Berkeley headquarters.

(Los Angeles Campus)

J. H. MATHEWSON, research engineer. Special field—safety engineering and serves as principal administrative engineer for the Institute on the Los Angeles campus.

D. L. GERLOUGH, assistant engineer. Special field—electronic instruments. Develops devices for studies in traffic characteristics and driver behavior.

G. N. BRITTLE, assistant engineer. Special field — instrumentation and psychophysical studies of drivers.

L. W. CATION, assistant psychologist. Special field—psychophysical measurements and analysis of driver behavior.

Headquarters of the Berkeley office of the Institute of Transportation and Traffic Engineering is located at Room 201, Building T-7, University of California. Berkeley 4, California. Telephone ASherberry 3-6000, Extension 805.

The Los Angeles office of the Institute is located at the College of Engineering, University of California at Los Angeles, Los Angeles 24, California. Telephone BRadshaw 2-6161, Extension 538.

The staff's personnel is being chosen to undertake, as quickly as possible, an attack on the pressing engineering problems in transportation and to aid the highway development program insofar as a University can contribute to that objective.

Harmer E. Davis, Professor of Civil Engineering on the Berkeley campus, has specialized in the fields of concrete, soils, and other engineering materials and is the author of numerous books and articles on these subjects. He has been an active member of many professional and honorary organizations, including the American Society of Civil Engineers, American Society for Testing Materials, Association of Asphalt Paving Technologists, and the American Concrete Institute. In the latter organization, he was awarded the Wason Medal for the most meritorious paper presented at its 1931 convention.

Donald S. Berry, for the past five years Director of the Traffic and Transportation Division of the National Safety Council, is a Professor of Transportation Engineering. He received his Doctorate in Civil Engineering from the University of Michigan and has published extensively in the fields of traffic, accidents, and safety. He has served on numerous national committees for traffic training, control, and education, and is a member of the Society of Automotive Engineers, Institute of Traffic Engineers, and other professional organizations.

Ralph A. Moyer was formerly Research Professor of Civil Engineering at Iowa State College and for the past 20 years has won wide recognition for his highway engineering research studies and is an outstanding authority on the economics of motor vehicle operation. He is the author of numerous publications in his field and is the recipient of several awards for his services.

Cecil J. Van Til comes from Purdue University where he received his Master's Degree in Civil Engineering this year.

Fred N. Finn, formerly connected with the soils laboratory of the Southern California Edison Company, has been a graduate student in soil mechanics on the Berkeley campus for the past year.

J. H. Mathewson graduated from the University of Michigan in 1931 with the degree of B.S. in Civil Engineering and received the M.S. degree in engineering in 1938. He has had experience in teaching, construction and communications. During the war he served first with the U. S. Air Force as regional safety consultant for twelve western states and as chief safety engineer at the headquarters in Washington, D.C., and later as a commissioned officer in the U. S. Navy. He has published a number of papers and articles on accident prevention and is a member of the American Society of Safety Engineers and the Southern California Industrial Safety Society.

W. LeRoy Cation received a B.S. degree in 1936 and an M.S. degree in 1939 from Iowa State College. During the war he served as assistant communications officer aboard a destroyer escort in the Southwest Pacific Area and later as assistant administrative officer in the Bureau of Aeronautics. His civilian experience has been largely gained in the field of personnel and occupational research in government and industry. He is a member of the American Psychological Association.

Gordon N. Brittle received his B.S. degree in mechanical engineering from the University of California in June of 1943. Upon graduation he received his commission in the U. S. Navy and subsequently spent a year aboard an aircraft carrier and a year and a half in the submarine service. Prior to coming to U. C. L. A. he was with Douglas Aircraft as an air conditioning engineer.

Daniel L. Gerlough received the B.S. degree from the California Institute of Technology in 1937 and the M.S. degree from the University of California in 1948. He has held engineering positions with several concerns in the Los Angeles area. Subsequent to an assignment as a lecturer in engineering during the summer of 1948 he was appointed to the staff of the Institute.

Advisory Group

Continued from page 1

The Committee consists of specialists in engineering, contracting, legislation, planning, traffic enforcement, administration, safety, mass transit, municipal and county administration, air transport, utilities, and other fields intimately associated with all phases of transportation. It was created to guide the development of the Institute's program and the Committee will meet periodically.

Members of the Committee include FREDERIC L. ALEXANDER, General Manager, County Supervisors Association of California; WALLACE W. BOGGS, County Surveyor and Road Commissioner, Alameda County; WARREN K. BROWN, Director of Transportation, California Public Utilities Commission; EARL F. CAMPBELL, Director, Western Region, National Safety Council; WARREN E. CAREY, Director, California Aeronautical Commission; FELIX CHAPPELLET, Chairman, Freeways Sub-committee of the Metropolitan Traffic and Transit Committee, Los Angeles Chamber of Commerce.

ROY W. CRUM, Director, The Highway Research Board; R. M. GILLIS, Assistant State Highway Engineer, State of California; RICHARD GRAVES, Executive Director, League of California Cities; J. E. HAVENNER, Public Safety Department, Southern California Automobile Association; Dr. LAWRENCE I. HEWES, Chief, Western Headquarters, United States Public Roads Administration.

CHARLES LYON, Legislative Representative, The Trucking Industry, Inc.; J. O. MATTSON, Automotive Safety Foundation; EDWIN MOORE, California Automobile Association; CLIFFORD E. PETERSON, Commissioner, California Highway Patrol; J. L. SPRINGER, Western Highway Institute; RALPH G. WADSWORTH, City Engineer, San Francisco.

Institute Program to Aid County, City Road Officials

As a part of its program to aid in the several phases of street and highway development throughout the state, the Institute on Transportation and Traffic Engineering has been giving considerable attention to ways and means for aiding the counties and cities on technical matters concerned with their road and street development.

As one step in this program, Harmer E. Davis, Acting Director of the Institute, has, over the past several months, been visiting county road commissioners and city engineers to discuss their local types of problems and to determine where the Institute can help in solving these problems.

To provide a means for city and county engineers to assemble for discussion and advice on problems which have arisen since the new Collier-Burns Act has been placed into effect, a three-day "California Institute on Street and Highway Problems" is scheduled for January 31 and February 1 and 2, 1949, in Berkeley. Here it is expected that city and county engineers will be able to find answers to some of their questions concerned with administration, reporting and budgeting, as well as on technical affairs. This will be the State of California's own "Road School," and has great possibilities in the way of serving as a clearing house for questions which inevitably arise when a state undertakes a progressive road development program. Included also in the Road School program will be conferences and discussions on some of the headaches which confront the engineers in the urbanized areas, such as traffic congestion.

As another step, the Institute has been offering In-Service Training courses aimed at bringing engineers in the various city and county road departments up-to-date on developments in road construction. A short course on asphalts and asphaltic mixtures for pavement construction has already been offered in the Bay Area and the Los Angeles Area, and is scheduled for the San Diego Area in January, in the Fresno Area in February, and later in the extreme northern portions of the state. A short course on concrete mixtures and their control as applied to pavements and highway structures will be scheduled around the state somewhat similar to that for the asphalt course. In preparation is a short course on subgrades and base materials.

The Institute also will serve as a source of trained young engineers, and will further aid city and county highway development by means of the results of research and the dissemination of up-to-date information.

Calendar of Events

Numerous courses are on the calendar of events under sponsorship of the Institute of Transportation and Traffic Engineering and the Extension Division of the University of California. Those scheduled for the near future include:

Special Institute and Short Courses

WESTERN INSTITUTE FOR TRAFFIC TRAINING, sponsored by the Institute of Transportation and Traffic Engineering, the University Extension Division of the University of California, and the National Committee for Traffic Training, on the Berkeley campus.

Peace Office Traffic Training...Jan. 31–Feb. 11

Accident Records and Their Uses....Feb. 7–11

Chemical Tests to Determine Intoxication .....Feb. 7–11

Fleet Supervisor Training for Motor Vehicle Accident Prevention.....Feb. 7–11

Pedestrian Protection .....Feb. 7–11

Traffic Engineering .....Feb. 7–11

Seminar on Public Support Program Planning .....Feb. 9–11

Tuition for the above courses is $20 for one-week courses, $35 for the two-week course, $5 for seminar, and an additional fee for the "Chemical Tests to Determine Intoxication" course. For information regarding registration and housing write to Helen V. Hammarberg, Registrar, University Extension, University of California, Berkeley 4, California.

* * *

Other Courses and Conferences to be Presented in Conjuction with the Institute Include:

Fleet Supervisor Training, Los Angeles campus.....Feb. 14–18

Conference for Traffic Court Judges and Prosecutors: Berkeley campus..Feb. 7–11

* * *

CALIFORNIA INSTITUTE ON STREET AND HIGHWAY PROBLEMS. January 31, February 1 and 2, Berkeley campus.

SHORT COURSE ON "DESIGN AND CONTROL OF CONCRETE MIXTURES," with reference to pavements and highway structures. L. Rothgerry, Instructor. Six Saturday mornings beginning January 15, Berkeley campus.

Seminars

Graduate seminars scheduled for the spring term on the Berkeley campus, beginning February 14.

TRAFFIC ENGINEERING: OPERATIONS. Course—Transportation Engineering 298. Donald S. Berry, Instructor. Mondays and Wednesday, 7:30 p.m.–9 p.m.

HIGHWAY LOCATION AND DESIGN. Course—Transportation Engineering 298. Ralph A. Moyer, Instructor. Tuesdays and Thursdays, 7:30 p.m.–9 p.m.

AIRPHOTO INTERPRETATION. Course—Transportation Engineering 298. Cecil J. Van Til, Instructor. Mondays and Wednesdays, 7:30 p.m.–9 p.m.

DESIGN AND CONTROL OF ASPHALTIC MIXTURES. B. A. Vallerga and A. Olitt, Instructors. Wednesdays, 2 p.m.–4 p.m., and lab period.

Engineers with experience in these fields are invited to attend as auditors.

University Extension Courses of Interest to Transportation Engineers

APPLICATION OF ENGINEERING ECONOMICS. T. J. Canty, Instructor. Begins January 14—Oakland Extension Center.

AIRPHOTO INTERPRETATION. Cecil J. Van Til, Instructor. Begins February 8—San Francisco Extension Center.

ADVANCED SOIL WITH APPLICATION TO HIGHWAY ENGINEERING PROBLEMS. D. P. Krynine, Instructor. Begins February 10—San Francisco Extension Center.

ELEMENTARY SOIL MECHANICS. B. A. Vallerga, Instructor. Begins February 21—Oakland Extension Center.

TECHNICAL REPORT WRITING. A. E. Edstrom, Instructor. Begins March 1—San Francisco Extension Center.

OTHER COURSES of interest to civil and highway engineers will be offered during the spring term through the Engineering Extension Division of the University. Information regarding these courses may be obtained at any Extension Division office.

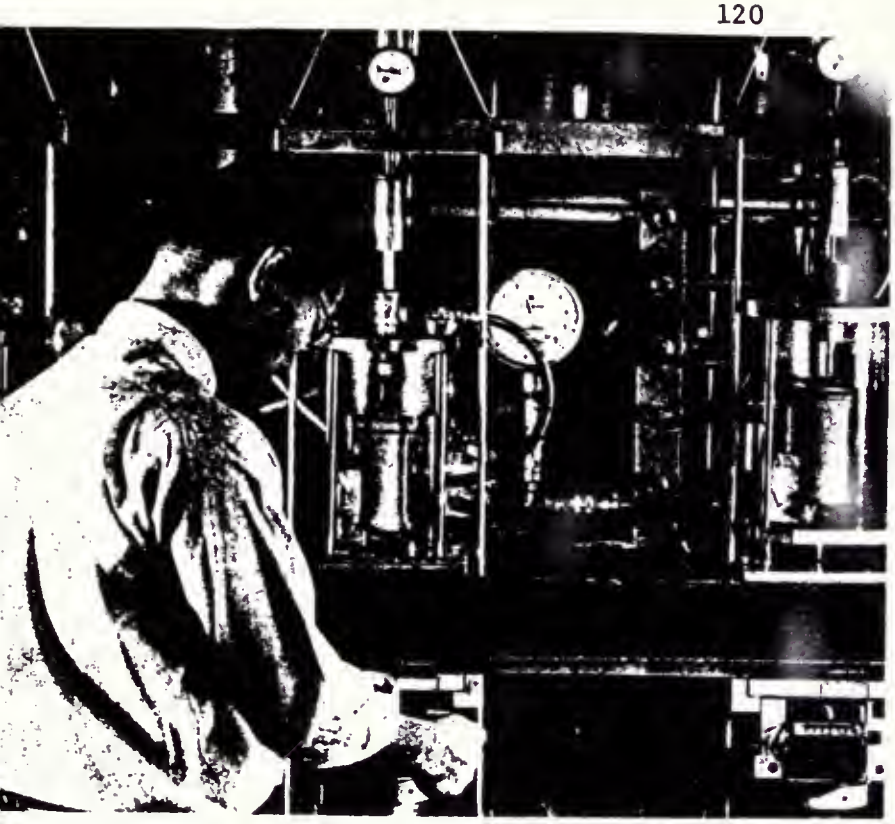
Institute Publications

Issue of two types of publications is a proposed goal of the Institute. One, a quarterly publication of which this is the first edition, will provide a means for making announcements, broadcasting plans and policy, and recapitulation of progress. The second is envisioned as a technical bulletin series which would provide an outlet for research papers and also serve as a means for disseminating technical information for which there is a need and a demand within the State.

Summer Institutes Planned

Plans now are being made for a series of courses to be held during the first two weeks of August. Three courses will deal with driver education and training for secondary schools and for representatives of colleges and universities. An advanced course for motor vehicle fleet supervisors is also being planned for the week of August 8.

APPENDIX C*



Scientists Work to Help Make Highways Safer and More Economical, Reduce Accidents

University of California's Institute of Transportation and Traffic Engineering Conducting Research on Many Problems

Laboratories at Richmond Field Station have produced wealth of new information whose effect is already to be seen along highways and in other transport fields.

Are you a motorist struggling to navigate today's traffic? Are you a pedestrian with an interest in the safety of yourself and others? Are you a citizen anxious that the dollars you pay in taxes shall produce the maximum in road, street, or airport construction? Are you a suburbanite dependent on rapid transit to get to and from work? Then you'll be glad to know that there's a whole corps of scientists in the Institute of Transportation and Traffic Engineering of the University of California who are working hard to find the answers to your problems.

Whatever American transportation may be like in the future—and it is certain that the next few years will bring many changes, particularly in highway transport—many of the improvements will be based on the work of this Institute. In fact, its influence is already felt in the design of safer and more economical highways and in improved methods of handling traffic and in means of preventing accidents.

Some of these effects have come about through new facts uncovered by new techniques developed by the Institute through its studies and some have resulted from field application of ideas gained by engineering personnel of cities, counties, the state and even other states and some foreign countries who have graduated from the Institute or have participated in its short courses.

The Institute of Transportation and Traffic Engineering now has graduates active in both traffic and engineering operations of the State Division of Highways, of many California counties and cities, in the United States Bureau of Public Roads, and in the engineering departments of a number of universities across the country.

While much of the Institute's work is not apparent to the motoring public, other portions are evident if one knows where to look for them. An example is in improved lighting at various points. Another example is seen on signs which give warnings of turnoffs from freeways; formerly two or even three destinations might be given on these signs with only the distinction of arrows to indicate which route to take; now destinations on the main and turnoff roads are separated by a line. The Institute found that addition of these lines greatly reduced the mistakes drivers made in taking or ignoring the turnoff.

In its laboratories and shops at the Engineering Field Station, Richmond, and on the campuses of the University of California at Berkeley and Los Angeles, the staff and stu-

*Motorland, May/June 1957

Inferior surface concrete.

Inferior surface asphalt.

Skid-resistant concrete.

Skid-resistant asphalt.

Slipperiness of different types of highway surfaces was shown graphically by Institute of Transportation and Traffic Engineering study. Skid-resistance of surfaces shown at bottom was three to four times that of surfaces at the top.

dents of this busy institution are pursuing a multitude of studies and research projects, some of immediate consequence and some of long range nature. The Institute is also carrying on a comprehensive program of education devoted to formal college work, with emphasis on graduate study, and to spreading new information about roads and streets, airports, traffic and what makes automobile drivers act the way they do.

All this came about largely through the late Senator George Hatfield, who was a strong and progressive leader in the California Legislature for many years.

As part of his work on the historic Collier-Burns Highway Committee in 1945-46-47, Senator Hatfield was greatly impressed with the seriousness and magnitude of the street and highway problems which California would be obliged to resolve in the years ahead. In a statement in 1947 he said:

"The time has come when we ought to provide the most intelligent approach we are capable of developing to our traffic problems. California needs — and must have — adequate scientific and research facilities to cope with these ever increasing difficulties."

Conferences were held with President Robert Gordon Sproul of the University of California and the University's Dean of Engineering, Mr. M. P. O'Brien, who showed considerable interest in the proposal. Your California State Automobile Association and the Automobile Club of Southern California supported the idea and, with the backing of Senators Randolph Collier and Arthur Breed, Assemblyman Michael Burns and other leaders, legislation was enacted creating the Institute of Transportation and Traffic Engineering.

The language of the special act creating the Institute was broad enough to permit it to act in any field of transportation—ground, air or water-borne — including rapid transit.

Merely to create a legal entity such as the Institute, however, was not enough. It had also to be organized, staffed and equipped, and before any of these could be done it was necessary to formulate a program. In this, resort was had to the counsel of an Advisory Committee of some 20 representatives of public and private organizations having responsible interest in transportation and traffic matters. To head the operation, the University selected Professor Harmer E. Davis, a member of the Engineering faculty on the Berkeley campus, who incidentally, was recently elected a director of your California State Automobile Association. Professor Davis has had a distinguished career in engineering education and research, currently heads the Department of Civil Engineering at the University and for twelve years was responsible for the organized research activities of the University's Engineering Materials Laboratory.

In organizing the Institute's faculty and research staff, two considerations were involved:

1. It was recognized that a large amount of research would have to be done, including work of a fundamental and long range nature in several highly specialized fields.

2. It was determined that the staff should be composed of men outstanding in their own particular fields, but also with a broad, comprehensive, understanding view of the entire transportation field.

Thus, faculty members teach courses in their specialties and work together in committees or project groups for particular items of research, each member contributing his special knowledge but all, at the same time, keeping in mind the place of the project in the overall transportation picture.

The Institute works in several ways. Its staff provides the instructors for undergraduate classes open to students in the University of California Engineering Department during their junior and senior years. These classes emphasize engineering subjects having special application to transportation, such as highway engineering, traffic engineering, railroad engineering, and transportation economics.

Here's what happens when an automobile hits a solid object at 40 miles per hour. Super-fast camera recorded effects on dummies and upon all parts of the car.

The Institute conducts post-graduate classes and seminars, open to engineering graduates in highway planning and economics, transportation statistics, airport planning and design, advanced highway and traffic engineering, and finance and administration. Many of these classes are held in the late afternoon or evening, so that they may be attended by graduate engineers already working at their profession.

It also carries on an extensive program of publication, making quickly available the results of studies and researches.

And, what currently is making the most noticeable impact on California road and highway construction are its conferences and short courses for city engineers, county road commissioners, state highway engineers, officials in charge of traffic matters,

and others concerned with transportation. These meetings have been of great value to local officials and engineers and reach annually about 3,000 individuals.

The chief of these affairs is the California Street and Highway Conference, held annually, alternately at Los Angeles and at Berkeley. This is a three-day event. Programs for these conferences are prepared from recommendations made by a large Advisory Committee, which represents all phases of street and highway design, construction and use, including your California State Automobile Association. A typical recent program, for example, included discussions and papers on legislative views of the highway situation, electronic weighing of vehicles, an instruction manual for a street or road department, pavement markings, noise measurements, public parking, the manpower shortage and others, each presented by an authority or group of authorities. These conferences are attended by transportation men in all levels of government and in other related transportation fields.

There have also been conferences on such matters as airport financing, fundamentals of traffic engineering, fundamentals of traffic police service and the training of motor vehicle fleet supervisors.

Besides all this, the Institute makes available, through the Extension Division, courses which may be taken either for credit or merely for advancement of the student's professional knowledge.

All these courses are arranged to meet the needs of the prospective student. To determine what these needs are, faculty members are in constant contact with the men doing the actual design, construction and operation of various means of transportation, or working in the traffic field.

The work of the Institute has been divided between the Berkeley and Los Angeles campuses, the former emphasizing the planning, economic and physical design aspects of the transportation problem and the Los Angeles campus group concerning itself more with the human factors involved — the behavior of drivers, the effect on drivers of such controls as signals, signs and markings, and the impact forces caused by crashes. To this end the Los Angeles staff of the Institute includes specialists in psychology and physiology as well as in engineering.

The Institute has laboratories at the Engineering Field Station at Richmond for the study of highway structures, the testing of automotive devices, the design of highway and airport illumination systems, and research in bituminous mixtures and soils. This last has been especially valuable, inasmuch as the durability of a road, airport runway or taxiway is closely related to the nature of the soil on which it rests.

As part of its work, the Institute developed instruments and methods of determining the density of soils and their moisture content by radioactivity, without removing any of the soil. These were used in important work at San Francisco Airport.

The Institute has also developed methods and devices for measuring the smooth riding quality and skid-resistance of road surfaces.

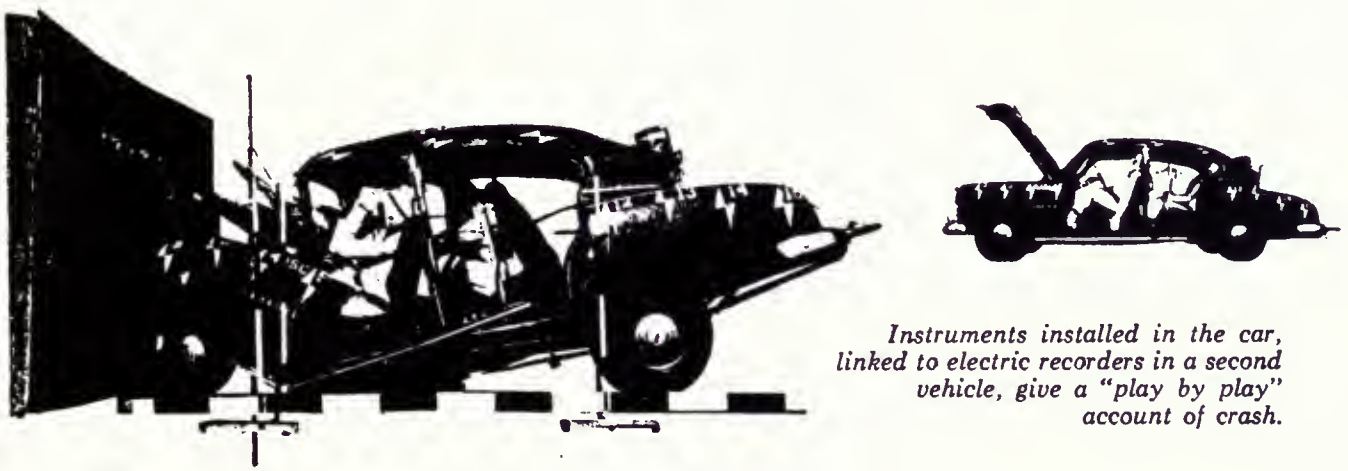
Sometimes a test or study in one field will reveal facts highly important in another. For instance, in making a study of the effect of signs reading "Slow Vehicles Keep Right," fundamental information on speed, headway and volume relationships on a freeway were uncovered, all of which are useful in determining how many vehicles a given road can carry safely.

Studies have been made of the strains and impacts on drivers and passengers resulting from a crash. Valuable information has also been developed on the extent to which tinted windshields affect visibility, on the density of smoke on the highway—an important matter for traffic officers—on highway lighting, highway noise, right of way, drainage, design of airport taxiways, toll roads, and planning for heliports.

One of the most valuable features of the Institute is its library, to which your Automobile Association has contributed several items. This is certainly the foremost highway transportation library in the western states and one of the best in the United States. This library now consists of about 6,000 monographs, printed reports and bound volumes of scientific societies' proceedings, and 680 serial publications. All these are catalogued so efficiently and in such detail that even a novice can find, almost at a glance, everything in the library relating to a particular subject.

Besides this, the library issues, for Institute students and other interested persons, lists of recently published articles and reports on transportation topics. Such lists may include as many as 200 items.

Each year the library issues a list of reports, articles and monographs prepared by the students and faculty, alone or in collaboration with engineers in state or federal service, or research sections of private enterprise. The 1955-56 list contains 68 items, which is again evidence that the Institute loses no time in passing on the new facts it gains.



Instruments installed in the car, linked to electric recorders in a second vehicle, give a "play by play" account of crash.

Men and Jobs

University of California's Harmer Davis (center) and a staff of specialists are curing ills in . . .

Transportation: A Challenge for ITTE

Not long ago—on a Los Angeles test site—a remotely-controlled vehicle with an instrumented dummy in the driver's seat was crashed into a rigid obstacle to gage effects of collisions. Some 400 miles away, in Berkeley, a truck equipped with different types of mufflers was measuring highway noise.

Behind both studies is the trail-blazing Institute of Transportation and Traffic Engineering, which operates within the University of California's departments of engineering at Berkeley and Los Angeles. And, in turn, behind the Institute's growing record of statewide service is a team of men, headed by Harmer E. Davis as ITTE director.

Under the watchful eye of Harmer Davis, ITTE is carrying out a man-sized mission—education and research related to design, construction, operation and maintenance of highways, airports and allied facilities for public transportation. It also shoulders added responsibility of interrelated problems dealing with traffic control, highway safety and design.

ITTE can take credit for curing many transportation ills in a state where traffic tends to be fin-to-fender. Yet it is barely 10 years old.

Back in 1947 mounting transportation problems in tourist-trodden California produced a period of near-crisis. It was then that state legislators—deciding strong medicine was needed—pushed through laws aimed to act as a tonic to transportation. One of these set up ITTE, set aside $350,000 for first-year functions.

This was where Harmer Davis came in. A professor of civil engineering at Berkeley, he had logged up 18 years research experience in the University's engineering materials laboratory. When ITTE opened shop early in 1948, he was asked to help with its development. The assignment was supposed to be a temporary one. As one college colleague puts it: "Originally, the University wanted someone with a 'name' to head ITTE. But Harmer did such an outstanding job that it kept him on."

Harmer Davis, cloaked in classroom and laboratory atmosphere, wasn't certain he would like the new post. "It meant shifting from physical research—where you can come up with answers you can put your teeth into—to dealing with people and organization." But today he concedes: "There was never a dull moment, and here I am."

The teacher-researcher turned out to be an affable, able administrator. But he is the first to point out that ITTE's deeds have been due not only to workers within the Institute, but to people outside as well.

For example, there's the advisory committee—some 20 University appointees representing a cross-section of viewpoints in transportation. Besides helping to guide ITTE undertakings, these experts add practical know-how to research and extension projects. But their special forte, perhaps, has been to keep open lines of communication with other researchers and the field of operations.

Administration of the Institute is handled through engineering departments on both campuses. At Berkeley, a Division of Transportation Engineering—set up parallel to other engineering divisions—directs course work. At Los Angeles, transportation, like other engineering subjects, is incorporated in the unified engineering curriculum.

ITTE management is in the hands of an executive committee uniting the director, two assistant directors (Norman Kennedy at Berkeley, J. H. Mathewson at Los Angeles) plus M. P. O'Brien, dean of the college of engineering at Berkeley, and L.M.K. Boelter, dean of the college of engineering at Los Angeles. This policy-making quintet also takes on the task of supervising monetary matters. (ITTE, bankrolled by the University budget, has an annual fund of over $400,000.)

ITTE is not an unwieldy organization. It's staffed by some 25 specialists—8 of them on the southern campus—plus about the same number of general

assistants. Most of the specialists shuttle between teaching and research (Harmer Davis himself primes students in soil mechanics and foundations, group and individual studies and research in transportation). And several are engaged jointly by the Institute and other engineering divisions, with the latter footing a share of their salaries.

From its infancy, ITTE had to face up to a blunt fact: Transportation takes in so many branches that no one is likely to be posted on all. So, says Harmer Davis, it seemed logical to design the scheme of technical operations around a small team of individuals—"each a specialist in some important segment of the field, yet having an appreciation of over-all aspects."

His philosophy goes farther: "If you want to develop individual thinkers, you have to give talented people full rein. In their functions of teaching and research, universities aren't line organizations. So to the utmost extent possible, we in ITTE work by what you might call 'cooperative individualism'."

SHORT COURSES, such as this one in traffic engineering fundamentals, are one phase of ITTE extension program that attracts an annual enrollment of over 3,000.

• **The educator emerges**—Harmer Davis' choice of career was not merely a matter of chance. "Dad was a builder, so it's in my blood." And it was the influence of construction in the early Twenties that moved the Davis family from Rochester, N. Y. (where Harmer was born 52 years ago), to California, where the post World War I building boom was in full swing.

When it came time for college, the builder's son picked architecture for his field of study. But he shifted to civil engineering—"I seemed to be more at home there"—and it was in this field that he received his B.S. degree (with highest honors and as a Phi Beta Kappa) at Berkeley in 1928.

After graduation, he looked around to see where he could grab a foothold in structural engineering. But Raymond E. Davis—no relation, but a famed and familiar figure on the Berkeley campus in his role as civil engineering professor and director of the engineering materials laboratory—talked him into staying on to do graduate work.

From then on the young engineer's interest began to swing to research. And from 1928 to 1930—while working toward an M.S. in civil engineering—he served as an assistant in the University's testing lab.

After collecting his master's, he again was about to head out into the field. But this time he was persuaded to take an instructorship. Soon afterward the depression began, bringing in public works and a boom in research of materials and structures. And for the next 15 years—as research engineer in the University lab—he was kept busy with the painstaking process of research in materials and structures, including many problems connected with highways.

Today, the research bug is still in Harmer Davis' blood. But ITTE duties mean that he must lend a hand to on-campus education and extension services as well as research.

• **On-campus education**—The Institute's college-level program, as explained by Director Davis, has three objectives:

- To furnish competent instruction in undergraduate courses involving transportation engineering.
- To establish a graduate program of transportation engineering for professional education of advanced engineering students.
- To provide, through the graduate program, for development of a few selected graduates with a broad outlook on transportation problems.

ITTE looks upon transportation today as an unprecedented challenge. And so—anticipating an emerging need for engineers with an over-all grasp of transportation puzzles—it offers opportunities at both campuses for taking up transportation and traffic engineering as part of a general engineering education. Berkeley undergraduates may stress transportation in their last two years of civil engineering; choose such subjects as highway, railroad and traffic engineering; route surveying; economics of location; transportation economics.

Graduate students at both University sites can continue engineering education with a broad scope of studies i transportation and traffic. Los Angele emphasizes human factors, motor veh cle collision characteristics, traffic flo simulation, analysis and programmin of transportation data on high-spee computers. Berkeley accents plannin and design of highway and air transpor facilities (including materials and struc tures); engineering administration, ecc nomics and finance; street and highwa illumination. Both give attention t transportation theory, traffic enginee ing and traffic safety.

At each campus, highlights of othe departments are tucked into ITTE' graduate program. These include cit and regional planning, statistics, ecc nomics, psychology and public adminis tration.

Harmer Davis interprets ITTE's at titude on specialization this way:

"We feel that we are preparing youn men for a lifetime career. We don't be lieve that they usually know exactl what niche they may later fit into, s we tend to design a rather broad pr gram so far as those first few years ar concerned. A result is that the amoun of specialization that we can give a the undergraduate level is relativel small. We feel that undergraduate must be well rounded in physics, chem istry and mathematics, and that suc emphasis as is possible be in subject fundamental to a broad area—such a materials and hydraulics for those point ing toward civil engineering."

Thus he favors a fairly broad four year engineering foundation, leavin the student to pick his specialty late on. "Often such a choice can be bette made when a man shows promise o rapid progress as a result of experienc in the field. He is then more mature knows what questions he wants an swered, and generally is more disposed toward absorbing advanced professiona training."

A case history of one ITTE graduate helps prove Harmer Davis' point. Afte getting his B.S. in CE and joining a road department in the West, this engi neer realized that he wanted highway work for a career. "But I didn't fee that the extent of highway training in a normal CE degree had prepared me sufficiently for the type of work I de sired to perform in the field."

So he enrolled at the Institute, ob tained a Master of Engineering Degree in transportation. Today—a design en gineer with a top U. S. engineering firm—he is a strong ITTE booster. "Its pro gram already has advanced my career considerably, both in position and finan cially. The wide field of activities and subjects in the Institute has given in sight into many problems that men who

ON-CAMPUS EDUCATION carried out by ITTE features undergraduate offerings in transportation engineering within the civil engineering curriculum, as well as graduate programs designed to develop a broad outlook on transportation problems.

have been in the field for years have not realized existed."

• **Research projects**—About half of ITTE's effort has gone into research. And—recognizing that research ranges from organized fact finding to solve a problem at hand to forays into the unknown or pursuit of a theory—it tries to channel main work near the middle of the road. It excludes small problems, but encourages some work out of which new concepts may grow.

At present, about 30 projects are under way. Harmer Davis sorts them into eight broad groups:

• **Transportation theory**—This is derived from mathematical and logical analysis of traffic flow and long-distance air travel patterns. Work centers on fundamentals and improving practical techniques of travel forecasting.

• **Economics and administration**—Major concerns are long-range planning and financing, principles of operations of engineering organizations, and interrelations—both among modes of transportation and organizations of various jurisdiction. Special attention is being given to urban matters, including resident and commuter travel patterns.

• **Airport planning**—These projects deal with geometric and structural features of airports. Under contract with the Airways Modernization Board, ITTE is measuring turn-off speeds and deriving high-speed exit taxiway designs for a full range of military and civil aircraft.

• **Highway planning**—Typical project: Measuring skid resistance and riding quality on hundreds of road sections, supporting an extensive study of pavement surface design.

• **Traffic engineering**—Studies cover traffic flow and route capacity, criteria for traffic controls, design of controls as governed by driver reaction, and flow simulation as a basis for systematic area control.

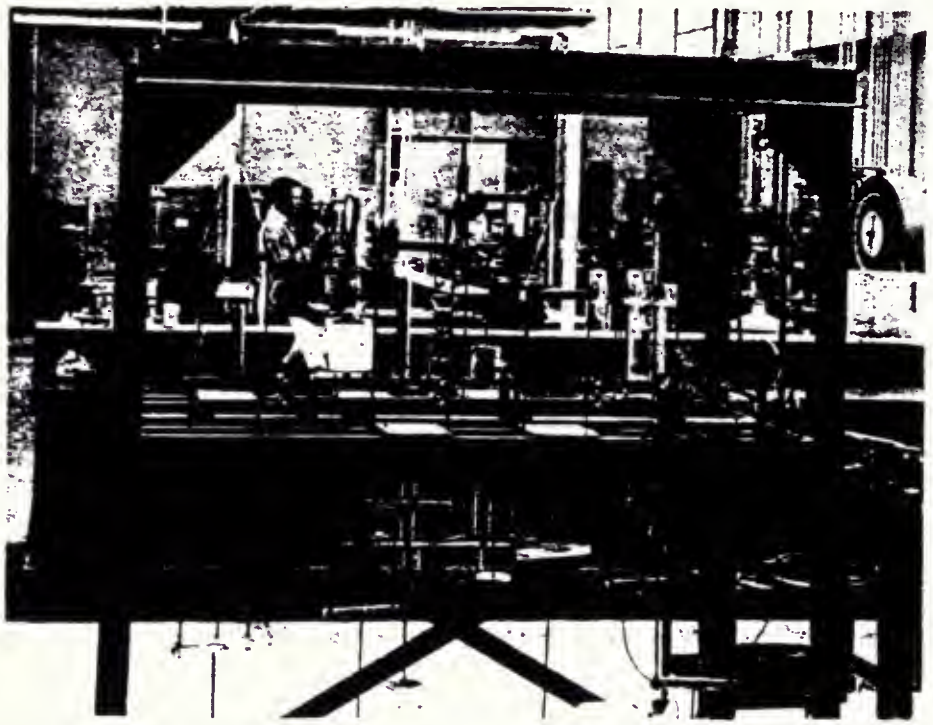
• **Human factors**—Principal work deals with physiological aspects of collisions, attitudes of multiple-offense vehicle drivers, and development of an advanced driver simulator for across-the-board study of driver behavior.

• **Vehicles**—Collision research figures here, too. A variety of studies deals with traffic noise and visibility. Performance tests are run on vehicle illumination devices and safety belts (ITTE operates the testing agency for the California Highway Patrol).

• **Materials and structures**—Behavior of asphalt mixtures and soil characteristics under repeated loading is being investigated. Equipment has been developed for field measurement of soil moisture and density by radioactive probes. Mobile strain-measuring equipment has been used to study stresses set up by dynamic loading of actual bridges.

Harmer Davis emphasizes that ITTE is trying to treat as wholes many things that heretofore have been seen and studied in pieces. For an example he points out how problems associated with driver behavior and vehicle operation have been lumped together. Once this is done, two broad ways of tackling the combination begin to look promising:

• Develop better understanding of human beings in traffic situations—a kind of "human engineering" approach. Do people with certain attitudes become traffic violators? Do fast drivers have more accidents than slow ones? Can some accidents be explained by understanding the interaction of psychological and geographical aspects of the trip? What is the relationship of speed in accidents to human survival? It was



RESEARCH ACTIVITIES, which account for about half of ITTE's effort, currently are concentrated on some 30 projects. Laboratory work ranges from basic research in soils through studies of facilities and system operations to driver behavior.

to answer these questions that a small team boasting psychologists and statisticians as well as engineers was set up on the southern campus. This now has evolved into the driving-simulator design group.

• Consider over-all characteristics of traffic movement—think of vehicles as particles in streams of flow, to learn what they tend to do under different road conditions, and how as a mass they respond to various controls. And this is the tack taken in much of the traffic engineering research on both campuses.

• Extension program—"We try to find out what kind of information should be summarized and interpreted for men-on-the-job." This is Harmer Davis' explanation of the third major phase of ITTE activities—extension services.

Here ITTE's record speaks for itself: Close to 3,000 Californians enroll each year in extension offshoots (50% in conferences, 45% in short courses, 5% in credit courses).

Field work has been termed "the key" to planning extension programs. ITTE staffers don't sit back and wait for suggestions—they buttonhole officials in road agencies and other organizations to find out what's needed as well as to evaluate previous offerings. Staff members contend that only through close contact with operating agencies and individuals can ITTE subjects be adjusted to actual needs and coordinated with work of other groups.

• General services—"You may find this one hard to document," says Harmer Davis, "but we feel that ITTE performs an important public service by providing facts and neutral opinion at the places where they are most usable. Staff members frequently are called upon to advise legislative committees, public officials and citizens' organizations on transportation matters. Such provision of facts and unbiased appraisal of problems can be a significant contribution to the making of public policy."

Then, too, both to reinforce educational procedures and to pass on research results, ITTE has set up a publishing program. Through it, information collected or developed by the staff is made available to the field in a variety of publications and in papers delivered before meetings.

Harmer Davis himself is responsible for a good portion of technical papers. As far back as the 1931 convention of the American Concrete Institute, he, as co-author with Raymond Davis, received the Wason Medal for the most meritorious paper presented. More recently, his subjects have ranged from cements, soils and asphalts to highways and transportation—and he is co-author of books on portland cement concrete and materials testing.

The ITTE head firmly believes that real professional life is one of continuous education, and that an engineer should be much more than a technician. "His continuing education should be aimed at development of the whole man and enjoyment of the full life."

The engineer, he feels, must constantly strive toward as balanced a development as his capabilities will permit, along three lines:

• **Technically**—"We don't need to be greatly concerned here. The engineer generally desires to be more proficient technically."

• **As a citizen**—"From time to time we hear (and forget!) exhortations voiced in our engineering meetings that the engineer should take greater interest in public affairs."

• **Intellectually**—"We should not leave to chance the development of our powers of comprehending, judging and reasoning with respect to the broad problems that face us as a supposedly intelligent segment of humanity. Let me call attention to the possible frustrating effect upon our intellectual life of overemphasis on mere technical knowledge."

What are some of the critical deficiencies in engineers?

ITTE's director feels that most of them lie outside the engineering field—perhaps in human relations, history, economics. "But I am sure that one of them is facility in the art of communication. And an idea is no good unless it is communicated."

He points out that engineers may arrive at sound conclusions and worthy plans, but unless they can be interpreted in terms the public can understand, it is difficult to win acceptance. Communication, he says, is an art, a skill that engineers sometimes reject as being outside their scope of activities. "Yet many a well-designed job cannot be carried out because it lacks public support. And the missing link is public understanding."

Today—in a state where there are close to 7 million motor vehicles and more than 3,000 annual traffic deaths—ITTE still has a big job ahead.

But Harmer Davis, taking stock of accomplishments as ITTE rolls by the milestones, is optimistic. He hopes that the Institute will have at least two results:

• By fostering, coordinating and guiding study and research, it will develop new information and analytical procedures that will add to the economy and effectiveness of transportation.

• By stimulating interest in transportation by its activities, as well as by formal teaching, it will contribute its share in development of future leaders in the field—"leaders who we hope will have broad vision and perspective as well as a high order of technical competence."

Scientific and Professional Societies - Active

American Automobile Association
Member, Board of Directors, 1963-~~66~~

American Concrete Institute - Member
Director, 1949-51
General Chairman of National Convention, 1951
Committee on Plastic Flow of Concrete, 1930-38
Committee on Volume Changes and Plastic Flow in Concrete, 1938-53
Committee on Vibration of Concrete, 1938-52
Committee on Construction Joint Practice, 1941-53 (Chairman, 1947-53)
Committee on Fatigue of Concrete, 1947-56

American Public Works Association - Honorary Member
Board of Trustees of the Research Foundation, 1955-57
Chairman, Long-Range Planning Committee, 1963-64
Member, Board of Trustees of Education Foundation; Member, Board of Directors 1969-

American Road Builders Association
Vice President, Western Region, 1953-54
Member, Education Division, 1953-date
Director, Educational Division, 1961-64

American Society of Civil Engineers - Fellow
Special Committee on National Highway Program, 1954-55
Committee on National Highway Program, 1955-56
Technical Procedures Committee, 1956-57
Highway Division - Member
Executive Committee, Member, 1954-Oct. 1958
Vice-Chairman, 1955-56
Chairman, 1956-57
Committee on Highway Engineering Manpower, 1955-date
Committee on Session Programs, 1956-57
AASHO-ASCE Highway Division Joint Committee, Co-Chairman, 1957-59
Member, Coordinating Committee on Transportation, 1960-date
Chairman, Committee on Highway Transportation Policy

Member, Board of Direction, 1960-1963
Member, Committee on Publications, 1960-63 (Chairman, 1962-63)
Member, Committee on Member Qualifications, 1960-1963 (Chairman 1962-63)
Member, Committee on Professional Conduct, 1960-63
Member, Special Committee on Code of Ethics, 1961-62

Chairman, Committee on Society Prizes, 1964
San Francisco Section, Member
Soil Mechanics and Foundations Committee, 1937-53
Division of Soil Mechanics and Foundations, 1953-date
Highway Division, 1953-date
Program Committee, 1951, 1953
Special Committee on Rapid Transit, 1956
Professional Objectives Committee, 1956-59
Vice President, 1956-58
President, 1959
Member, Building Code Committee, 1959
Member, Committee on Organization and Representation, 1959-date

3

American Society for Engineering Education - Member
Lamme Award Committee, 1946-50
Civil Engineering Division - Member
Committee on Foundations and Soil Mechanics, 1947-50 (Chairman 1950)
Committee 4, Transportation, Member 1957-60

American Society for Testing and Materials - Member
Committee on Soils for Engineering Purposes, 1947-53
Committee on Road and Paving Materials, 1948-58

California State Automobile Association
Member, Board of Directors - 1956-date

California State Chamber of Commerce
Member, Statewide Highway Committee, 1952-date
Central Coast Highway Committee, 1949-59
Grade Crossing Study Committee, Chairman, 1950-1952

Engineers Joint Council
Member, National Transportation Policy Panel, 1959-date

Highway Research Board of the National Research Council
Executive Committee, Member, 1955-date; Vice Chairman 1957; Chairman, 1959
Committee on Highway Organization and Administration, Chairman 1950-59
Committee on Stress Distribution in Earth Masses, 1949-54
Project Advisory Committee for Study of Intergovernmental Relationships in Highway Affairs, Chairman, 1951-53
Department of Economics, Finance and Administration, 1955-date
Ad Hoc Committee for Development Study of Urbanization in Relation to Transportation, 1954-56
Committee on Urban Research, 1956-date
Member, Committee to Study the Organization and Work Program of the Department of Economics, Finance and Administration, 1958-60
Special Committee on Highway Research Priorities, 1958-61
Member, Division of Administrative, Management and Legal Studies, 1960-date
Member, National Advisory Committee for the AASHO Road Test, 1959
Technical Consultant to the Committee on Public Dissemination of Research Findings, 1960
Chairman, Committee for the Award of the Roy W. Crum Distinguished Service Award, 1961

Institute of Traffic Engineers - Affiliate
Member, Special Committee to Review Scope and Purpose, 1969-71

International Road Federation
Member, Spanish Traffic Engineering Manual Committee, 1960-64
Member, Outstanding Fellowship Award Committee, 1962-64

4

National Research Council
Division of Engineering and Industrial Research, Member-at-Large, 1961-date
Member, Executive Committee, 1961-date

Society for the History of Technology - Member, 1962-date

Triaxial Institute (A voluntary association of research engineers of Western States to develop more scientific methods of study of soils and bituminous materials.),
Member - active, 1948-52
honorary, 1953-date

ITTE Gen. Info
Calif. Legis. - Senate

Senate Concurrent Resolution No. 83

Introduced by Senators Collier, Alquist, Carrell, Marks, Mills and Moscone

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INSTITUTE OF TRANSPORTATION
AND TRAFFIC ENGINEERING

May 20, 1971

REFERRED TO COMMITTEE ON TRANSPORTATION

Senate Concurrent Resolution No. 83—Relative to the University of California.

LEGISLATIVE COUNSEL'S DIGEST

SCR 83, as introduced, Collier (Trans.). University of California.

Declares legislative intent re Institute of Transportation and Traffic Engineering at U.C., expressing the Legislature's concern as to desirability of continuing existing programs and expanding scope and enlarging responsibilities of the institute. Urges regents to make provisions for the institute to undertake certain specified functions.

Fiscal Committee—Yes.

WHEREAS, The Senate of the California Legislature, the Assembly concurring, hereby finds and declares:

a. The Institute of Transportation and Traffic Engineering was established at the University of California by the regents in response to Chapter 1573, Statutes of 1947. At that time there was great need for a formalized training and research program to prepare personnel for greatly enlarged responsibilities in transportation as a result of legislation enacted by the Legislature.

b. The Institute of Transportation and Traffic Engineering responded to the needs for training and research then expressed, and since that time scores of engineers have received advanced degrees who are now actively engaged in transportation planning, engineering and management as employees of the state, the counties, the cities, and as consultants in California. Hundreds of engineers and other professionals have taken short courses in transportation engineering and management through extension offerings sponsored by the institute. The institute provides virtually the only ongoing program of continuing education for county engineers, and others in similar positions, in transportation engineering, traffic safety, and related matters.

c. Increasing understanding of relationships between transportation and social, economic, and environmental factors as well as recent developments with regard to rapid and mass transit programs call for new emphasis in research and training for engineering and management personnel engaged in transportation. The Legislature finds it advisable, therefore, to express its concern to the regents as to the desirability not only of continuing existing programs but also of expanding the scope and enlarging the responsibilities of the Institute of Transportation and Traffic Engineering, so that it may respond to emerging and foreseeable needs for California in the transportation field.

d. The enabling statute under which the institute was established is sufficiently comprehensive to embrace the proposed scope and responsibilities to which the Legislature desires to direct attention explicitly; now, therefore, be it

Resolved by the Senate of the State of California, the Assembly thereof concurring, That the Regents of the University of California are urged, to the extent they deem it appropriate, to make provision for the Institute of Transportation and Traffic Engineering to:

(1) Cooperate in research and training with the State Business and Transportation Agency and its departments and with other agencies charged with responsibility for the design, construction, operation, and maintenance of highways, airports, rapid and mass transit systems, and other related facilities for public transportation. In addition to, but not to the exclusion of, other appropriate subjects for research and study, the institute shall give attention to (a) the interrelated problems of highway design, traffic control, and highway safety, (b) ground access to airports and harbors, (c) effective coordination of the several modes of transportation to achieve a balanced public transportation system, and (d) interrelationships between development and operation of transportation facilities and the social, economic, and physical environment; and

(2) Cooperate with the state and local governmental agencies, by the assignment of graduate students to cooperative programs or by other appropriate means, in conjunction with projects involving innovations in transportation to be recommended by such agencies for consideration by the State Transportation Board. Such projects shall include, but not be limited to, expediting the application of knowledge in the biological, physical, and social sciences to transportation systems, and should include new combinations of existing technology to serve multiple functions.

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INSTITUTE OF TRANSPORTATION AND TRAFFIC ENGINEERING · UNIVERSITY OF CALIFORNIA

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Quarterly Bulletin

Davis Retiring

Harmer E. Davis, director of ITTE since its founding 25 years ago, is retiring from regular University service June 30.

Recognizing not only his leadership of ITTE but also his prior contributions to teaching and research, the University Berkeley campus has presented him with its highest honor, the Berkeley Citation. "for distinguished achievement and notable service."

His service to the transportation field. and ITTE accomplishments under his leadership have been recognized by the Senate of the California Legislature. through resolution of its Rules Committee.

"Under Professor Davis," the resolution reads, "the Institute has provided outstanding public service and research for the Legislature and State agencies, the cities and counties and special districts of this State, as well as agencies of the Federal Government."

It notes that "the Institute has supported the education of hundreds of graduate students in transportation engineering programs, who are now practicing throughout the world and has provided professional instruction to thousands of practicing engineers by means of short courses and conferences."

The resolution goes on to say, "Professor Davis has personally contributed immeasurably to the solution of transportation problems through his numerous publications and his unstinted service in leadership roles in many organizations."

When the Institute was formed, Davis first faced the task of developing a new kind of educational and research group from scratch. His task was a pioneering one. He has maintained the pioneering spirit throughout his directorship. His current concerns have been with new ways of analyzing and teaching multimodal and multi-disciplinary approaches to transportation planning and design, especially for urban transportation.

Davis's work at the University covers more than 40 years. Before assuming the ITTE directorship he had won national recognition for his research in construction materials. Awards and honors have poured in all through his years as ITTE director. In 1958–59 he served as chairman of the Highway Research Board.

While going off the "active list." as regulations (and time) demand. Davis typically has a backlog of special assignments. projects, and writings. all concerned with the forefront of transportation engineering, with which he will be continuing without pause.

HARMER E. DAVIS

A successor as ITTE director has not yet been designated.

Exercise in Teamwork

A fourth offering of the one-year pioneering course called Multidisciplinary Design has just been sucessfully completed. The course description reads: "Design of projects requiring participation of several disciplines and design professions. Organization and conduct of multidisciplinary design teams. Interaction with community decision-making processes in establishing project goals, social and environmental considerations."

With Professor Harmer E. Davis. civil engineering, and Professor Michael Goodman, architecture, serving more as advisers than instructors, students largely organize themselves and conduct a comprehensive study of a selected locality.

This year's group consisted of 24 students from architecture. business administration. civil engineering (construction and transportation), environmental management, geography, history, and social welfare. The study area: Vallejo.

Coming Events Cast Their Shadow . . .

A studied view of the character of street and highway activity throughout California through the remainder of the 70's has been presented to California public works officials by R. J. Datel, State Highway Engineer.

Fundamental to his view is the premise that whatever kind of transportation systems the public may decide are essential in the long run, sweeping changes cannot be effected overnight.

"Even assuming," he said, "that the people through their legislators decide to change direction as a result of the 1976 California Transportation Plan, the long lead time required to plan and build other modes would bring us to the 1980's before notable change could be effected."

Datel did not attempt to assess the extent of eventual modal shifts but addressed himself instead to realities in the immediately forthcoming years when "streets and highways will remain the workhorse of the system."

Public Attitudes

He identified three current public attitudes toward streets and highways. One view, and apparently the majority view, is that we have no major transportation problems. The second and third views say we do have major problems, but the views are opposed as to what the problems are. The second view is that we should spend much less on highways in order to help solve other problems, especially environmental degradation. The third view is that additional highway improvements are badly needed.

As to the first, "no problems" view, Datel pointed out that one sure way to

vite a problem for tomorrow is to ignore day its possibility.

As to the second, "spend less" view, he ferred to the provisions of Assembly ill 69, which will lead to the California ransportation Plan. This plan is to be oad in its consideration of issues and npacts, is to encompass all modes, and to be built from extensive inputs, es-cially from the local levels.

New Approaches

As to the third, "more needed" view, noted the ever-growing project back-g, the growing discrepancy between eeds and dollars available to meet them. ith no relief for this situation in sight, emphasized the importance of alter-ate approaches to system improvement, cluding:

More consideration of transportation corridors.

More encouragement of the use of high-occupancy vehicles.

More attention to traffic operational techniques that will increase the capac-ity of existing facilities.

Extension of preferential treatment for buses.

Emphasis on special traffic improve-ment projects.

s to the application of these approaches, described the central idea as thinking terms of what is best for the overall ghway system rather than what is the st project for a small piece of a par-cular highway.

Looking Ahead

His summary pointed to a series of con-tions that seem likely to hold through e years immediately ahead:

Funds will be inadequate to make the improvements requested of the Highway Commission or to meet highway needs as traditionally perceived by those re-sponsible for the State highway pro-gram.

Emphasis will be on making the existing highway system work better. Local governments will have a more important role in the transportation decision-mak-ing process.

Valuation of environmental impacts re-sulting from transportation proposals will continue to be emphasized.

High-level involvement of the Federal government in the State highway pro-gram will continue.

Datel presented these views at the 25th alifornia Transportation and Public orks Conference, held in San Diego this larch.

ew Deans

ERNEST S. KUH, professor of electrical ngineering, has been appointed Dean of e College of Engineering at Berkeley, effective Sept. 1. He recently served for four years as chairman of the Department of Electrical Engineering and Computer Sciences. Before coming to Berkeley in 1956, he held research positions with the Bell Telephone Laboratories.

ROBERT L. WIEGEL, professor of civil engineering, is currently serving as Acting Dean.

RUSSELL R. O'NEIL, professor of engineering systems, has been appointed Acting Dean of the School of Engineering and Applied Science at Los Angeles.

CHAUNCEY STARR, who has been Dean at Los Angeles, is assuming the directorship of the energy research center established by publicly and privately owned electric utilities.

Graduates at Peak Level

Graduate enrollments in the Transportation Engineering Division at Berkeley averaged 195 students per quarter in the year now closing. The Division includes four specialties, in which approximate enrollments were transportation 92, geotechnical 78, construction 19, and photogrametry 6.

The Division total is at about the ceiling now set by quotas on graduate enrollments in the College of Engineering. The Division total is expected to be at about the present level in the years immediately ahead, but some shifts among the specialties are anticipated.

In the transportation specialty, the following students received degrees in fall and winter (June degrees not yet available):

SEPTEMBER 1972

PHILIP C. AGOSTINI, MS. (Entered from the University of Cincinnati, Cincinnati, Ohio).
BRIAN L. ALLEN, Ph.D., Assistant Professor, McMaster University, Hamilton, Ont., Canada.
PEDRO J. ANDREZA-SAAVEDRA, MS. (Entered from Universidad de los Andes, Merida, Venezuela).
ARTHUR T. BERGAN, Ph.D., University of Saskatchewan, Saskatoon, Sask., Canada.
GERARD C. M. CLABENS, Ph.D., consulting engineers, Caracas, Venezuela.
LAURENCE A. GRUVER, MS, (Entered from University of Santa Maria, Caracas, Venezuela).
ALEXANDER R. HAMMOND, MS, Federal Aviation Administration, Washington, D.C.
CHARLES J. HOCH, MS, Federal Aviation Administration, Washington, D.C.
PAUL B. KATZ, MS, (Entered from Yale University, New Haven, Connecticut).
ROSS J. LOWE, MS, U. S. Forest Service, San Francisco, California.
JORG K. MEISE, MS, Battelle-Institut, E V, Frankfurt/Main, Germany.
MARVIN L. OLSON, MS, Federal Aviation Administration, Washington, D.C.
MICHALIS PEDILIVANIDIS, MS, continuing study.
ROBERT J. ROCHE, MS, Federal Aviation Administration, Washington, D.C.
RONALDO DE ABREU SERTA, MS, A/C Bluhms, Rio de Janeiro, Brazil.
MELVIN M. YOSHIKAMI, MS, (Entered from California State College Long Beach, Long Beach, California).

DECEMBER 1972

ROBERT M. SULLIVAN, ME, U. S. Forest Service, Berkeley, California.
ALBERTO BRUCK, MS, (Entered from the University of Santa Maria, Caracas, Venezuela).
AVISHAI CEDER, MS, (Entered from Israel Institute of Technology, Haifa, Israel).
GEORGE W. ERIO, MS, (Entered from the University of Illinois, Urbana, Illinois).
CEDRIC I. ESCALANTE, MS, (Entered from Universidad of Juarez Autonoma de Tabasco, Villa Hermosa, Tabasco, Mexico.
MICHAEL P. FINNEGAN, MS, Metropolitan Transportation Commission, Berkeley, California.
IYACKUDDY JEEVANANTHAM, Ph.D., University of Singapore, Singapore.
ARTHUR J. NEGRETTE, MS, (Entered from California State University Hayward, Hayward, California).
NORIO OGAWA, MS, Dorokodan Shikenjo, Tokyo, Japan.
KHOSROW OVAICI, M.S., (Entered from University of Tehran, Tehran, Iran).
HANS J. PETERS, MS, Highway Engineer, International Bank for Reconstruction and Development, Washington, D.C.
PETER WONG, MS, (Entered from University of California, Berkeley).
SAN-FU YEH, MS, Taiwan Public Works Bureau, Taipei, Taiwan, Republic of China.

Extension–73-74

A variety of extension offerings are being planned for 1973–74. Those so far scheduled are listed below. In addition, ITTE is cooperating in the development of a seminar on the planning and design of pedestrian and bicycle facilities to be offered by the Metropolitan Association of Urban Designers and Environmental Planners at Disney World, Florida, Dec. 13–15.

AIRPORT MANAGEMENT (2½ days)
Asilomar, Pacific Grove ....Jan. 23–25, 1974

CALIFORNIA TRANSPORTATION AND PUBLIC WORKS CONFERENCE (2½ days)
Hilton Inn, Oakland Airport
.....Mar. 27–29, 1974

DEVELOPMENT AND DESIGN OF MULTI-PROJECT PUBLIC WORKS MANAGEMENT SYSTEMS (2½ days)
Richmond* .....Sept. 26–28
Richmond* .....Nov. 28–30
San Jose .....Oct. 24–26
*Separate offerings

FIELD MANAGEMENT OF PUBLIC WORKS CONSTRUCTION AND MAINTENANCE PROJECTS (12 hours, 2 weekends)
In 15 cities to be scheduled

FUNDAMENTALS OF TRAFFIC ENGINEERING (5 days)
Richmond .....June 17–21, 1974
UC Irvine .....June 24–28, 1974

MOTOR FLEET MAINTENANCE (2 days)
Los Angeles .....Oct. 15–16

MOTOR FLEET SUPERVISION (3 days)
Los Angeles .....Oct. 17–19

MOTOR FLEET TRAINERS, TRAINING FOR (5 days)
Berkeley .....Sept. 10–14

PLANNING FOR CIVIL ENGINEERS AND SURVEYORS (5 days)
Alisal Ranch, Solvang .....Feb. 11–15, 1974

PUPIL TRANSPORTATION SUPERVISION (5 days)
UC Berkeley .....Aug. 6–10

SLOPE STABILITY AND FOUNDATION INVESTIGATION (12 hours, 2 weekends)
In 15 cities to be scheduled

Research

Where Should The Money Go?

On what basis should highway funds in California be allocated to State and local governments?

Seeking an answer to that question, the State Legislature, in 1971, created the State Highway Users Tax Study Commission and directed it to reach findings as to the feasibility of existing, modified, or entirely different allocation methods.

Richard E. Zettel of the ITTE staff at Berkeley is presently engaged in an extensive analysis of allocation problems, for which the Commission has contracted with the University. Zettel describes the present basis of allocation as a crazy quilt.

That, he points out, is not to say that the present basis is ill-conceived or that any other basis can be immediately labeled as clearly better. Rather, he is referring to the tangled history of allocation formulas, making it difficut to isolate the practical consequences of existing procedures or of changes.

Mixed Objectives

The present method of allocation rests on a complex of formulas and includes traces of formulas adopted 25 and even 50 years ago. As new needs appeared, new formulas were added, often while old formulas were retained. For many years, the process of change has gone forward without overall appraisal of allocation objectives. Inconsistencies result.

As an example, 10–60 division of allocations between north and south is premised on the idea of returning funds to the point of origin, without reference to needs in the two areas. Within the areas, however, allocations for minimum expenditures are made according to needs (estimated needs), without reference to where the funds originated.

Coordination

At the moment, the Study Commission's task is further complicated by 1972 legislation establishing a State Transportation Department and calling for the Department to propose a California Transportation Plan in 1976. Present due date for the allocation proposal is 1974.

Following this schedule would mean that the allocation proposal would have to be submitted before the nature of the plan that it was intended to support was known. In view of this, the Study Commission intends to seek changes in its assignment and reporting date so that the two activities may be coordinated.

Modeling Model Freeways

Freeway-related studies (BULLETIN, July 1972) continue to forge ahead under the supervision of Adolf May, of the ITTE staff at Berkeley, with benefits in the form of contributions to traffic theory, educational/research opportunities for graduate students, and real-life application by operating agencies.

The work is now going forward in three general areas.

Design and Control

The first concerns freeway operations and design. A freeway design evaluation model, under development since 1967, is now completed. It is primarily for application to an existing freeway, enabling a designer to determine the consequences of various changes in design or control. While this may be, and is, done without a computer model, the model cuts the time to a fraction, permitting far more alternatives to be examined in far more detail than would otherwise be practicable.

Inputs to the model are characteristics of the physical facilities, potential traffic demand, and method of control. Given specified facilities and traffic, the model can, through successive iterations, find the optimum control system. Similarly, it can find the optimum facilities design. Or, with all inputs described, it can find the cost effectiveness of various design and control combinations.

Recent support for this work has come from the California Division of Highways and the U. S. Dept. of Transportation. The model has or is about to be used in three of the Division's Districts.

The next step is to extend the model's application to a corridor: freeway section plus related surface system.

Priority Strategies

The second area of study has concerned priority operations on freeways. Adaptation of the foregoing model so as to permit analyzing the effects of introducing various exclusive-lane strategies is now essentially complete. This is the "on road" phase of the study. The study is now concentrating on the matter of entry control.

Recent support for this work has come from the California Division of Bay Toll Crossings and the U. S. Dept. of Transportation.

Servicing Emergencies

The third area of study concerns freeway emergency detection and servicing. Supported by the National Science Foundation, this work is being conducted through the College of Engineering's Operations Research Center. It presently consists of three studies by three doctoral students. They are developing answers to these questions: (1) Given a section of freeway on which incidents are to be detected by sensing devices, what are the optimum locations for the devices? (2) Given a freeway network, a detection system, and fixed-base servicing vehicles, what are the optimum locations of the vehicle bases? (3) Given a freeway network and so many dollars for detection and servicing, for what should the dollars be spent?

Who'll Fly STOL?

"Forecasting the Demand Potential for STOL Air Transportation" is the title of a project just completed for the Ames Research Center, of the National Aeronautics and Space Administration. The task was to develop a process by which demand potential can be estimated.

The work consisted of developing, calibrating, and testing a system of demand models and of demonstrating their application in a selected short-haul air travel corridor (Los Angeles-San Francisco was used).

Since operating STOL systems are not at hand, the study defined a number of variables that serve to describe what the characteristics of such a system would be. The developed models were then calibrated with data available from existing non-STOL systems. Heavy reliance was then placed on sensitivity analyses to estimate to what extent changes in the different variables would influence demand.

Flights Must Be Frequent

Schedule frequency was found to have the strongest effect on travelers' choices among available routes, significantly stronger than either travel cost or travel time.

Staff members participating in the study were Robert Horonjeff and Adib Kanafani. They point out that while the work provides a framework for forecasting, reliable estimates will require more information on system characteristics than is now available, particularly port locations, frequency of service, and fare structures.

Keeping the Planes Apart

Analysis of one important aspect of the air traffic control process is being undertaken for the Federal Aviation Administration in a project to be supervised by Robert Horonjeff, of the ITTE staff at Berkeley.

In-flight commercial aircraft at the same flight level must be kept separated by five miles or more. When a controller expects a separation to become less than five miles, he must intervene. The project calls for the development of models for estimating the potential number of controller interventions.

The models require development of probability distributions as to when con-

llers intervene, as well as distributions r aircraft separations.

The purpose of the study is to provide AA with a picture of the number of po-ntial conflicts and the workload imposed on controllers as a consequence. Such formation should assist the FAA in tablishing controller requirements and ocedures.

lew Books

affic Engineering

Fundamentals of Traffic Engineering—h Edition, is now available, again repre-nting a virtually complete revision and dating of earlier editions. Chapters ve been added on two new subjects, affic Stream Characteristics and En-ronmental Aspects of Transportation vith special sections on air pollution and affic noise), and expansion of previous aterial has led to separate chapters on tersection Design and Traffic Control stems.

Except that some chapters may require ference to standard handbooks of the ofession, *Fundamentals* covers the full nge of traffic engineering subject mat-r.

Eighth edition updating takes account the 1971 *Manual on Uniform Traffic ntrol Devices*, the new *California Traf-Manual* and *California Highway De-gn Manual*, and the 1972 *Highway ghting Standards*.

Of the authors, Norman Kennedy and olfgang S. Homburger are with the TE staff at Berkeley; James H. Kell. rmerly so affiliated, is president of JHK Associates, San Francisco.

Kennedy, Norman, James H. Kell, Wolfgang Homburger, *Fundamentals of Traffic Engi-ering—8th Edition*, 300 pp., paper bound, .00 (plus 30¢ for mailing; California orders d sales tax); order from the ASUC Book-re, 2215 Dana St., Berkeley, CA 94720.

icycles

Thirty-eight papers on the planning d design of pedestrian and bicycle facil-es, constituting the proceedings of a nference on that subject, will be avail-le in late July.

Subjects include studies of planned destrian environments; pedestrian cir-lation in urban areas, high-rise build-gs, and airports; pedestrian accident ountermeasures; planning criteria for keways; the cyclist in the urban set-ng; innovative bicycle equipment; and views of completed or in-progress bi-cle-facility plans and planning proce-ures in several metropolitan areas.

The proceedings are of a conference resented in San Francisco in December 1972, by the Metropolitan Association of Urban Designers and Environmental Planners. ITTE assisted in conference arrangements and undertook to publish the proceedings.

Proceedings of the Pedestrian/Bicycle Planning and Design Seminar, December 1972, 241 pp., paper bound, $6.50 (plus 30¢ for mailing; California orders add sales tax): order from the ASUC Bookstore, 2215 Dana St., Berkeley, CA 94720.

ITTE Publications

Availability Legend

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ITTE, 109 McLaughlin Hall, University of California, Berkeley, CA 94720; include payment if order under $5 (please make check to "The Regents of the University of California")

Course Notes

†*Fundamentals of Traffic Signal Design and Operation*, V. Hurdle, J. Ray, R. Hurlbut, C. E. Wong, V. Waight, and D. Gitelson. Sold by ASUC Bookstore, $2.00 (plus 30¢ for mailing; California orders add sales tax).

†*Street and Highway Maintenance Management*, R. E. Jorgenson, D. H. Park, and W. G. Mortenson. Sold by ASUC Bookstore, $2.50 (plus 30¢ for mailing; California orders add sales tax).

†*Eleventh Short Course in Airport Management*. Sold by ITTE, $2.00 (plus 30¢ for mailing; California orders add sales tax).

†*Twelfth Short Course in Airport Management*. Sold by ITTE, $2.50 (plus 30¢ for mailing; California orders add sales tax).

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Research Reports

No. 53. *An Approach to Statistical Analysis of County Traffic Accident Data*, Peter M. Hall.

Proceedings

Abstracts of Presentations at the Twenty-Third California Transportation and Public Works Conference. Held at Los Angeles, California, March 25–27, 1971.

†*Planned Unit Development*. Held at Berkeley, Calif., Oct. 29, 1971. Sold by ITTE, $2.00 (plus 30¢ for mailing; California orders add sales tax).

Dissertation Series

Assignment and Control in a Transportation Corridor, Brian L. Allen.

Minimum Cost Schedules for a Public Transportation Route, VanOlin Hurdle.

Stochastic Properties of Traffic, Gorden A. Sparks.

Vertical Transportation in Tall Buildings, Slobodan D. Mitric.

Graduate Reports

**An Empirical Investigation of the Arrival Process at San Francisco Airport*, P. Frank Castellon.

**A Study of Airport Terminal Gate Utilization*, Ramon D. Belshe.

Special Reports

**An Analysis of Alternative Oceanic Air Traffic Control Ssystems*, G. Couluris, R. Horonjeff and A. Kanafani. Also **Supplement.*

**Bay Area Freeway Operation Study — Final Report, Part III of III: On the Eastshore Freeway (I-80) Northbound*, John F. Aidoo, Robert W. Goedhart and Adolf D. May.

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**Priority Lane Operations on the San Francisco-Oakland Bay Bridge*, W. Stock, Jin J. Wang and Adolf D. May.

Transportation Analysis Procedures for National Forest Planning — A Process Review, A. Kanafani, R. Layton, and E. Sullivan.

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Quarterly Bulletin of the INSTITUTE OF TRANSPORTATION AND TRAFFIC ENGINEERING
June 1973
Wayne H. Snawden, Editor

Two for Retirement

Richard M. Zettel

Zettel speaking at the 32nd California Transportation and Public Works Conference in Monterey, April 1980.

Richard M. Zettel, ITS research economist and civil engineering lecturer, has retired from a 29-year career as a specialist in transportation economics and taxation at UC Berkeley.

Prior to coming to Berkeley, Zettel was director of research and statistics for the Washington State Tax Commission from 1938 to 1941, then highway economist with the U.S. (Transportation) Board of Investigation and Research, tax analyst for the California Joint Fact Finding Committee on Highways, Streets, and Bridges (1946-47), and tax analyst for the Pacific Gas & Electric Company. He is an alumnus of the University of Washington where he received a BA and an MA in Economics.

While at Berkeley, Zettel was continually involved in public service activities, especially at the state level. For a sampling, he:

- prepared issue papers for the State Highway Users Tax Study Commission on transport financing in California, particularly the distribution of revenues among transport modes, and was principal consultant to the Division of Transportation Planning of Caltrans on the financial part of the California Transportation Plan, then under preparation. (1972-75)
- served as special consultant to the Senate Transportation Committee, and produced the report *California's Highway Program in the Seventies: A System in Jeopardy*. (1975-76)
- prepared a background paper on AB402, then being considered by the legislature, for the California State Chamber of Commerce and the California Highway Users Conference. His report, *Transportation Reform Act of 1977 (AB402): An Analysis in Depth*, contributed to "turning around" opposition to the reform proposals, particularly those regarding the legislative budgeting of transportation funds. (1976-77)

On the academic side, Zettel developed and taught graduate courses in Transportation Policy and Administration and in Feasibility Analysis in Transportation Systems. He supervised a number of doctoral students writing theses on transportation policy subjects.

During his career at Berkeley, Zettel has taken several leaves to serve legislative and governmental agencies. In 1952-53, and again in 1957-58, he was executive secretary and director of research of the California Joint Legislative Committee on Highways. In 1954-56, he was on leave to the Presidential Commission on Intergovernmental Relations, where he was in charge of public finance studies and advisor to the commission's highway study committee. Then, from 1964 to 1969, he served as study director of the Bay Area Transportation Study Commission which prepared a comprehensive regional transportation plan for the nine counties of the San Francisco Bay Area. The commission was the forerunner of the Metropolitan Transportation Commission (MTC).

The committees on which Zettel has served and his other advisory activities are too numerous to list completely. A small sample includes membership on the Subcommittee on Resources and Transportation, Assembly Ways & Means Committee; frequent consultant on transportation financing to the Senate Transportation Committee; membership on the Committee on Taxation, Finance, and Pricing, Highway Research Board; and membership on the Technical Advisory Committee, Subcommittee on Transportation, Assembly Ways & Means Committee.

Some years ago Zettel acquired a second home in the Sierra Nevada above Sonora, California. With his wife Ginny, he has now moved there and plans careers in carpentry and skiing. ITS staff and friends bade them farewell at a dinner on October 4.

Beverly Hickok

"A temporary job lasting 32 years," laughs Beverly Hickok looking back upon her career at the Institute of Transportation Studies, Berkeley. Hickok, who has elected early retirement, will be leaving her position as head librarian in December 1980.

Hickok was only a year out of library school (UC Berkeley '47) when she took a chance on a temporary job, selecting and ordering publications for the newly created Institute of Transportation and Traffic Engineering (later called the Institute of Transportation Studies) in 1948. She was given one mandate: to spend $10,000 in the remaining two months of the fiscal year.

Working from a desk in a back office of the Engineering Library, the new librarian with a BA in American history (UC Berkeley '41) and a secondary teaching credential (UCLA '42) quickly learned what was significant information in the field of transportation. At the end of two months, she had not only spent the money but landed herself a full-time position as librarian for the institute.

A year later, almost a thousand monographs had been collected, and the collection could boast of 245 serial titles.

Hickok at the library in 1955. Both the Institute and library were housed at UC Berkeley's Richmond Field Station from 1952 to 1972.

But Hickok was dissatisfied with the way in which books received by the transportation collection were cataloged by the university's main library. The cataloging was too general to describe adequately the kinds of materials she was accumulating—there were only broad subject headings related to transportation. On her own, Hickok added original headings and cross-references for better retrieval of transportation information.

At the same time, she began analyzing important journal articles and papers presented at conferences, adding these to the growing card catalog—a practice that continues today. These early references are a unique source of information, not cataloged elsewhere.

In addition, she started cataloging news clippings from major local newspapers and, to gain further knowledge of her specialty, audited transportation courses.

Establishing contact with other transportation librarians early in her career, Hickok joined the Special Libraries Association (SLA) in 1950 and became an active member of its Transportation Division. By 1955, she was elected chair-

Beverly Hickok, continued

person of the division; she also served as president of the San Francisco Chapter of SLA.

In the early seventies, Hickok, as head of one of the largest transportation libraries in the U.S., was asked by the Transportation Research Board to participate in planning conferences for what was to be called TRISNET (Transportation Research Information Services Network)—a national system to improve access to transportation research information. In 1976, the ITS Library was awarded a U.S. DOT contract to provide documents referenced in the TRISNET system; the contract has been renewed annually since then.

Today the ITS Library continues to grow, adopting new technologies to meet the requirements of handling more and more transportation information. It is at the forefront of new technology in the organization and dissemination of this information: automated cataloging, the extensive use of microfiche, terminals to "access" national data bases.

At last count (June 1980), over 68,000 bound volumes, 13,000 microfiche, and 21,000 pamphlets had been accumulated, and the library was receiving over 2,200 serial titles.

The ITS Library is responding to the growing volume of transportation information and still providing unique services—a reflection of Hickok's care, thoughtfulness, and hard work in establishing the library and nurturing it to its present state.

Technical Services Librarian Michael C. Kleiber succeeds Hickok as head librarian.

ITS Extension Calendar

Field Supervision of Public Works Projects
Sacramento — November 15, 22
San Diego — December 6, 13

Roadway Lighting
Los Angeles — November 18

Traffic Engineering Planning
Berkeley — December 8-10

Traffic Engineering Operations
Berkeley — December 10-12

Airport Management
Asilomar, Pacific Grove — January 14-16

Automotive Fleet Administration
Oakland — January 27-28
San Diego — February 3-4
Sacramento — March 3-4

Pavement Rehabilitation
Richmond — February 21
Los Angeles — March 28

Traffic Signal Equipment and Operations
Richmond — March 13-14
Los Angeles — April 10-11

33rd California Transportation and Public Works Conference
Huntington Hotel, Pasadena — April 29-May 1

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For information write or call ITS Extension Programs, 12 North Gate Hall, University of California, Berkeley, CA 94720. Phone (415) 642-7350.

New Extension Staff — Lynne Christianson

New staff person at ITS-Berkeley Extension is Lynne Christianson, come recently from the Planning and Community Development Department of University Extension, where she worked on programs concerning city, regional, and environmental planning, community development, and related areas.

At ITS, Christianson will develop and implement the programs in transportation engineering and planning, public works project supervision, and construction techniques and management which ITS Extension has been offering since the Institute was formed in 1948.

"Emphasis will continue on offering 'basics' courses, appropriate as groundwork for incoming personnel of public agencies and private firms and as a refresher for experienced personnel. We will provide, as well, the unique public service of offering 'update' courses on rapidly changing aspects of the current transportation scene," says Christianson.

"ITS Extension courses now serve some 1500 transportation personnel every year, and we intend to expand our offering in response to the high demand for more information, insight, and technical detail in this constantly developing field."

Courses planned for spring include: Automotive Fleet Administration, Traffic Signal Equipment and Operations, Traffic Signal and Lighting Design, Pavement Rehabilitation, Asphalt Mix Design, Street and Highway Drainage, Roadway Lighting, and Fundamentals of Traffic Engineering.

Christianson gladly welcomes suggestions, comments, and feedback regarding ITS Extension program planning. Contact her at ITS Extension, 12 North Gate Hall, UC Berkeley, Berkeley, CA 94720; (415) 642-7350.

From page 3

Selected Publications from the Research

Publications are available from ITS-Irvine unless indicated otherwise. To order, see page 8.

● **Labor-Management Relations in Urban Mass Transit: An Annotated Bibliography.** Carder Hunt, Lyn Long and James L. Perry, Nov. 1976, 26 pp., UCI-ITS-WP-76-1 ($4.00).

● **The Impact of Labor-Management Relations on Urban Mass Transit Performance: Notes on Research in Progress.** James L. Perry, Harold L. Angle and Mark Pittel, Feb. 1978, 29 pp., UCI-ITS-WP-78-1 ($4.00).

● **The Impact of Labor-Management Relations on Productivity and Efficiency in Urban Mass Transit.** Final report, Phase I. James L. Perry, Harold L. Angle and Mark E. Pittel, Mar. 1978, 190 pp. available from the National Technical Information Service, Springfield, VA 22161 ($12.00).

● **The Impact of Labor-Management Relations on Productivity and Efficiency in Urban Mass Transit: Employee Attitudes, Withdrawal Behavior, and Bargaining Unit Structure.** Final report, Phase II. James L. Perry and Harold L. Angle, Mar. 1980, 236 pp., available from the National Technical Information Service ($14.00).

● **Labor-Management Relations and Public Agency Effectiveness: A Study of Urban Mass Transit.** James L. Perry and Harold L. Angle, Pergamon Press, Elmsford, NY, 1980, 208 pp., available from Pergamon Press.

Harmer Davis ballot statement,
American Automobile Associatio
January 1988.

HARMER E. DAVIS - Member since 1948

Occupation: Transportation engineering consultant. He is a professor emeritus and director emeritus of the Institute of Transportation and Traffic Engineering, UC Berkeley. Professor Davis has been a CSAA director since 1957, serving two terms as president and two terms as vice president. He served as an AAA director and as a member of the AAA National Advisory Council. He has served as a director of the American Society of Civil Engineers and is the recipient of numerous honors for outstanding achievement as a transportation engineer. **STATEMENT OF VIEWS:** The lack of needed maintenance and changing traffic patterns continue to restrict our mobility. Our well being and our way of life depend on a safe, efficient highway system. CSAA must continue to urge the development of practical approaches toward highway improvement.

Berkeleyan, May 8, 1996.

Transportation Library Named for Harmer Davis

Beverly Hickok, left, and Harmer E. Davis pose among the stacks in the recently renamed Harmer E. Davis Transportation Library.

The library, operated by the Institute of Transportation Studies, was named to honor Davis, 90, a professor emeritus of civil engineering and the founding director of Institute.

Hickok, who was hired by Davis in 1948 to start a transportation library, acquired an impressive specialty collection before retiring in 1980. Today, the library's collection consists of more than 150,000 volumes, 125,000 microfiche and 3,000 current serial titles, plus manuscripts, archives, maps and aeronautical charts.

At an April 22 dedication ceremony, the Institute's Berkeley director Adib Kanafani said, "Today we dedicate one of our best assets to a man who for so long gave us his best."

Davis received his BS and master's degrees in civil engineering from Berkeley before joining the faculty in 1930. Working with Professor Raymond E. Davis in the early days of geotechnical engineering, he helped develop cements that could meet specific needs of major public works projects such as the Bonneville Dam. He also was involved in soil tests that helped to determine the design of the San Francisco-Oakland Bay Bridge.

In 1947, concern about the poor condition of California highways prompted the California Legislature to fund a university institute to reconcile the latest research in transportation with state plans for highways and air fields. Davis became the Institute's first director—a job he held until he retired in 1973.

Harmer E. Davis

Director, Institute of Transportation
and Traffic Engineering

PAPERS AND PUBLICATIONS

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Testimonial Resolution

WHEREAS, HARMER E. DAVIS, a distinguished California citizen, educator and civic leader, has given over forty years of loyal and dedicated service to the California State Automobile Association as a member of its Board of Directors, and thereby to all of the motorists of California, Nevada and Utah; and,

WHEREAS, HARMER E. DAVIS, through his service since July 19, 1956 as a director of the California State Automobile Association and as Chair of its Board in 1975 and 1976, has done much to enhance the prestige of the California State Automobile Association and has been instrumental in its growth in membership and in service to the motorists of California, Nevada, and Utah and in its growth in prominence among motor clubs; and,

WHEREAS, HARMER E. DAVIS has advanced the interest of motorists nationwide through his service to the American Automobile Association as a member of its Board of Directors in 1974 and as a member of the AAA National Advisory Council from 1974 through 1981; and,

WHEREAS, HARMER E. DAVIS, as an instructor and professor of Civil Engineering and as Chair of the Department of Civil Engineering, at the University of California at Berkeley, California, as Director of its Institute of Transportation and Traffic Engineering, and as a traffic, transportation and engineering consultant and author, has contributed significantly, not only to the growth and economic development of his community, but to the advancement of transportation and traffic engineering and technology; and,

WHEREAS, HARMER E. DAVIS has contributed greatly to the welfare of his country, state and community and the citizens thereof through his service as a Fellow and Honorary Member of the American Society of Civil Engineers, as a member of the National Academy of Engineering, as a Trustee and Director of the American Public Works Association, as a Director of The American Society of Civil Engineers, and as a Member of the Editorial Board, Journal of Transport Economics and Policy (London School of Economics); and,

WHEREAS, HARMER E. DAVIS will retire from active service upon the Board of Directors of the California State Automobile Association on February 27, 1997.

NOW, THEREFORE, BE IT RESOLVED, that the Board of Directors of the California State Automobile Association, individually and collectively, takes this means of expressing its gratitude and appreciation to HARMER E. DAVIS for the many years of wise and generous counsel which he has contributed to the California State Automobile Association.

BE IT FURTHER RESOLVED, that HARMER E. DAVIS be nominated and declared an Honorary Lifetime Member of the Board of Directors of the California State Automobile Association and that this Resolution be spread in full upon the Minutes of this meeting and that a copy of this Resolution be presented to him as an expression of the warm affection and high esteem which we, his colleagues on the Board of Directors of the California State Automobile Association, hold for our friend, HARMER E. DAVIS.

January 24, 1997

Chair of the Board

President

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June 1997

VITA

WOLFGANG S. HOMBURGER

Born: Dec. 18, 1926, Karlsruhe, Germany

Education

B.C.E.	(Civil Engineering) Cooper Union, New York, 1950.
M.Sc.	University of California, Berkeley, 1951.

Professional Positions

1951-53	Construction Engineer; Pavement Design Engineer. U.S. Army Corps of Engineers.
1953-55	Active duty with the U.S. Army Corps of Engineers.
1955-1990	Research Engineer and Lecturer, University of California (UC). Acting Director, Institute of Transportation Studies (ITS), Dec. 1982-July 1983. Assistant Director, Jan. 1985 to Aug. 1990. Retired August 31, 1990.
1990-date	Instructor for ITS Extension; recalled as part-time Lecturer in Civil Engineering at the University of California. Part-time consultant.

Visiting Lectureships and Invited Lectures

1971	University of Salford, United Kingdom (7 months).
1975-77	Universidad de los Andes, Merida, Venezuela (total of 8 weeks).
1983	Universidad de Costa Rica (1 month).
1991	University of New South Wales, Australia (6 weeks).
1991/93/96	University of Canterbury, New Zealand (1 week each year).
1992-1994	University of Auckland, New Zealand (1 week each year).
1993	Federal Technical University, Zürich, Switzerland

Professional Memberships

American Society of Civil Engineers: Life Member

Institute of Transportation Engineers: Honorary Member (Life Fellow)
President, District 6, 1986-87; International Director, 1990-92.

Transportation Research Board
Past member of several technical committees and project panels.

Awards and Honors

Road Transport (Passenger) Medal, Chartered Institute of Transport, UK, 1971.
Excellence in Research Award, California Department of Transportation, 1988.
Honorary Member, Institute of Transportation Engineers, 1996.
Wilbur S. Smith Distinguished Transportation Educator Award, 1997.

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